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*DRAFT WORK PLAN FOR
REMEDATION OF LOCATIONS IN
GRANITE CITY, MADISON, AND
VENICE, ILLINOIS, ASSOCIATED WITH
NL INDUSTRIES/TARACORP SUPERFUND
SUPERFUND SITE
CONTRACT NO. DACW45-89-D-0506
DELIVERY ORDER NO. 0017*

Submitted to:

United States Army Corp of Engineers
Omaha District

Submitted by:

OHM Remediation Services Corp.
a subsidiary of



OHM Corporation

October 10, 1994
Project 16473.1

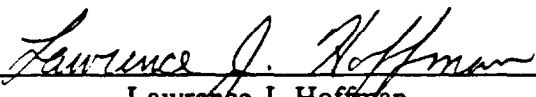
**FINAL WORK PLAN FOR
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NL INDUSTRIES/TARACORP SUPERFUND
SUPERFUND SITE
CONTRACT NO. DACW45-89-D-0506
DELIVERY ORDER NO. 0017**

Prepared by:



OHM Remediation Services Corp.
Midwest Region

Approved by:



Lawrence J. Hoffman
Project Manager

October 7, 1994
Project 16473.1

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1.0 INTRODUCTION

The United States Army Corps of Engineers (USACE) has tasked OHM Remediation Services Corp. (OHM), a wholly owned subsidiary of OHM Corporation, under the Preplaced Remedial Action Contract No. DACW45-89-D-0506, Delivery Order No. 0017, to perform removal of lead contaminated soil at various locations associated with the NL Industries/Taracorp Superfund site (NL Site) in Granite City, Madison, and Venice, Illinois. This remedial action requires the removal of lead contaminated soil (RCRA special waste - total lead >500 ppm, TCLP lead <5 mg/l) from approximately 70 residential sites.

This work plan (WP) is intended to detail the methods that will be employed to perform the work. This WP includes a discussion of the scope of work (SOW) in Section 2.0 and OHM's technical approach in Section 3.0. Section 4.0 discusses OHM's subcontractor management plan. OHM's project team and organization are presented in Section 5.0. The Contractor Data Acquisition Plan (CDAP) and the Site-Safety and Health Plan (SSHP) are included as Appendix A and Appendix B, respectively, and the Waste Management Plan is included as Appendix C. A contingency plan for hazardous waste removal is included as Appendix D.

1.1 SITE HISTORY

The NL Site includes the NL Industries/Taracorp Plant, a former secondary lead smelting operation located at 16th Street and Cleveland Boulevard in Granite City, Illinois. Prior to 1903, the plant included various smelting related equipment. From 1903 to 1983, secondary lead smelting occurred on site. These activities were discontinued in 1983, and the equipment was dismantled.

In July 1981, St. Louis Lead Recyclers, Inc. (SLLR) began using equipment on adjacent property owned by Trust 454 to separate components of the Taracorp waste pile. The objective was to recycle lead bearing materials to the furnaces at Taracorp and send hard rubber off site for recycling. SLLR continued operations until March 1983, when it shut down its equipment. Residuals from the operation remain on Trust 454 property with some equipment.

A State Implementation Plan for Granite City, Illinois, was published in September 1983 by the Illinois Environmental Protection Agency (IEPA). The IEPA's report indicated that the lead nonattainment problem for air emissions in Granite City, Illinois, was primarily due to emissions associated with the operation of the secondary lead smelter, operated by Taracorp, and lead reclamation activities conducted by SLLR. The IEPA procured Administrative Orders by Consent with Taracorp, SLLR, Stackorp, Inc., Tri-City Truck Plaza, Inc., and Trust 454 during March 1984. The orders required the implementation of remedial activities relative to air quality.



NL Industries, as former owner of the site, voluntarily entered into an Agreement and Administrative Order by Consent with the United States Environmental Protection Agency (USEPA) and IEPA in May 1985, to implement a Remedial Investigation/Feasibility Study (RI/FS) for the site and other potentially affected areas. Taracorp was not a party to the agreement because it filed for bankruptcy. The USEPA determined that the site was a Comprehensive Environmental Responsibility and Cleanup Liability Act (CERCLA) facility and it was placed on the National Priorities List on June 10, 1986.

1.2 SITE DESCRIPTION

The action requires the excavation and disposal of soil contaminated from the former lead smelter stack emissions in alleys, parking lots, driveways, and yards in residential communities. The communities include Granite City, Madison, and Venice, Illinois. The clean-up criteria outlined in the Record of Decision (ROD) March 30, 1990, as defined by the USEPA, requires the removal of all visual contamination from the alleyways and a clean-up criteria of 500 parts per million (ppm) of lead for the residential locations. Following the removal of the contaminated material, the impacted areas will be restored. This restoration will include sodding the yards and paving the alleys, driveways, and parking lots.

1.3 PROJECT OBJECTIVES

The objectives of this field effort is to excavate all lead contaminated soil from approximately 70 residential sites. The contaminated soil (stack emissions) is a RCRA special waste - total lead >500 ppm, TCLP lead <5 milligram per liter (mg/l).

Investigative sampling has been performed by Woodward-Clyde Consultants (WOODWARD-CLYDE) and reported in the Woodward-Clyde Draft Final Report, NL/Taracorp Superfund Site, Granite City, Illinois, October 1992.

Quantity determinations used for estimating amounts and costs of hazardous and nonhazardous materials for unearthing and disposal are based on the WOODWARD-CLYDE report. Based on the initial study, the areas of excavation have been generally defined. OHM will follow the direction of the USEPA on-site representative (OSR) to determine the limits of the excavation(s). Samples of the excavated material will be obtained to determine appropriate disposal options.

The cleanup criteria outlined in the ROD March 30, 1990, as defined by the USEPA requires the removal of all visual contamination from the alleyways and a cleanup criteria of 500 ppm of lead for the residential locations. Visual contamination consists of the visible battery chips in the soil and is defined as hazardous in the ROD. The contingency plan is included as Appendix D and provides the work plan if potentially hazardous materials are encountered while performing the stack emissions removal.



2.0 SCOPE OF WORK

This section has been prepared based upon the scope of work delineated by the document provided to OHM by USACE entitled:

**SCOPE OF WORK FOR
CONTRACT NO. DACW45-89-D-0506
STATE EMISSIONS (LEAD) REMOVAL
GRANITE CITY (MADISON COUNTY), ILLINOIS
DELIVERY ORDER 17
JUNE 23, 1994
FINAL REVISED**

The scope of work, in general, encompasses the following tasks:

- ▶ Work plan development
- ▶ Site visit
- ▶ Site administration
- ▶ Mobilization/demobilization
- ▶ Site preparation and teardown including the setup and teardown of decontamination facilities, support equipment trailers, clearing and grubbing of brush, paving, and landscaping
- ▶ Excavation of contaminated soil and restoration of contaminated areas
- ▶ Sampling and laboratory analyses as necessary to procure proper disposal of wastes and proper backfill sources
- ▶ Storage of nonhazardous wastes for classification and authorization for disposal at an IEPA special waste
- ▶ Transportation and disposal
- ▶ Final project report

2.1 WORK PLAN DEVELOPMENT

The project WP describes how the work will be performed according to the SOW as delineated by USACE and environmental, industry standard, and health-and-safety requirements.



The WP also consists of a CDAP, included as Appendix A. The SSHP is included as Appendix B, and the Waste Management Plan is included as Appendix C. Site-Specific Advance Agreements (SSAA) are included with the cost proposal submitted under separate cover.

The information provided by the previous characterization work performed by WOODWARD-CLYDE and the SOW provided by USACE served as the basis for the preparation of this WP and associated documents.

Remediation strategies and expectations in this WP were derived from previous on-site work efforts under the Rapid Response contract with the Omaha District Corps of Engineers.

2.2 SITE ADMINISTRATION/LOGISTICAL SUPPORT

Prior to full-scale mobilization to the site, logistical preparation activities will be performed, including:

- ▶ Hold pre-construction meeting
- ▶ Arrange for waste hauling licenses
- ▶ Meet with property owners
- ▶ Locate utilities at each property
- ▶ Establish transportation routes between each property and support area
- ▶ Coordinate with each local agency and hospital

The project site administration will be centrally established at the former USACE maintenance facility. Site administrative activities performed from this location will include:

- ▶ Site supervision
- ▶ Cost tracking/reporting
- ▶ Health and safety management
- ▶ Waste tracking/documentation
- ▶ Field sampling/analytical support
- ▶ Field purchasing/subcontract management
- ▶ Logistical support

2.3 MOBILIZATION/DEMobilIZATION

This task involves the transportation of personnel, equipment, materials, and other resources to and from the project site. A majority of the personnel and equipment will be mobilized at the beginning of the project and demobilized at the end of the project. This is especially true for the supervisory/administrative personnel and the support equipment such as vehicles and decontamination/office trailers. Most personnel and equipment will be mobilized from OHM's office in St. Louis, Missouri. Subcontractor mobilization and demobilization will be managed by the OHM project manager, in close conjunction with the site supervisor, to meet USACE's identified site-specific needs.



2.5 EXCAVATION AND RESTORATION

The 70 proposed locations vary in area and excavation depth. Table 2.1 lists identified sites based on information supplied by the USEPA. The USEPA will provide the data obtained from the WOODWARD-CLYDE Draft Final Report, NL/Taracorp Superfund Site, Granite City, Illinois, October 1992, which provides sample locations, depths, and analytical results.

OHM's schedule (as discussed in Section 3.1) for excavation has been developed to facilitate logistics and limit the time required to transport equipment and crews from location to location.

The excavation techniques employed at each location will vary according to location accessibility, depth, and the extent of material to be removed. Minimization of disturbances to adjoining properties/areas will also be a key consideration in performing each excavation. OHM anticipates using tracked excavators, backhoes, Bobcats, and manual removal methods.

Waste including special nonhazardous waste will be placed in stockpiles near the best loadout area during removal efforts. Stockpiles will be covered with polyethylene sheeting for non-work hours.

2.5.1 Controls

Dust control will be a major task. A water truck equipped with a spray bar and hand nozzle will be available at all times to prevent fugitive emissions. Water from decontamination sources will be recycled this way. The water truck will also fill site dedicated tanks for dust control by each excavation crew.

During excavation activities, engineering controls and security measures, such as surrounding the exclusion zones with fluorescent orange PVC barrier fencing, will be employed to prevent cross contamination and unauthorized entry to exclusion zones.

2.5.2 Restoration

After excavation and shipment of contaminated waste, OHM will restore the locations to pre-remedial conditions. Excavations will be backfilled with clean soil and paved as required by the SOW. Fencing and other structures removed during remediation will be replaced, and sodding and revegetation will be performed where necessary.

OHM will utilize a local fill source chosen for quality of fill and price. OHM will collect one sample of the backfill source to be used for the restoration activities. Additional backfill samples may be necessary if the soil composition/appearance changes noticeably. The anticipated analyses for the backfill sample include TAL, TCL, TCLP/metals, TRPH.



TABLE 2.1, HOUSE NUMBER OR PROPOSED SITE LOCATIONS

[illegible]

2.6 TRANSPORTATION AND DISPOSAL

The special waste associated with the locations from the WOODWARD-CLYDE supplied data indicates that all soil classified as nonhazardous will be stockpiled and directly loaded for disposal. IEPA approval for disposal will be established before shipment. Upon approval, this waste will be transported to a properly permitted nonhazardous landfill for disposal.

2.7 FINAL PROJECT REPORT

OHM will issue a final report at the completion of the project. The report will be prepared in draft final form for USACE review. The report will contain a summary of the work performed at each location, photographic documentation, survey data, analytical report, and transportation and disposal documentation.



3.0 TECHNICAL APPROACH

This section discusses the operational methods, types of personnel, and equipment that will be utilized to complete the SOW.

3.1 SUBMITTALS

Submittals include this project WP submitted as per the USACE SOW dated June 23, 1994; daily submittals; weekly status reports; hazardous-waste manifest biannual reports; hazardous-waste manifests; and a final report (refer to Section 2.8 of this work plan).

3.1.1 Status Reports

Weekly status reports will be prepared in accordance with the requirements of the scope of work and submitted to the locations specified by USACE by 0700 Central Standard Time on each Monday.

3.1.2 Transportation and Disposal

OHM will submit to USACE estimates of the amounts and types of wastes generated at the location for disposal in the weekly status reports and annual and biannual waste manifest reports. OHM will obtain currently required reporting forms related to the shipment and disposal of hazardous waste as per the SOW.

OHM will prepare waste profiles and manifests for USACE review, approval, and signature prior to the scheduled shipment of any wastes. OHM's Midwest Region transportation and disposal department will prepare waste manifests. OHM's transportation and disposal coordinator, will review all waste profiles, land disposal restriction notifications, certifications, and waste manifests prior to their submittal to USACE.

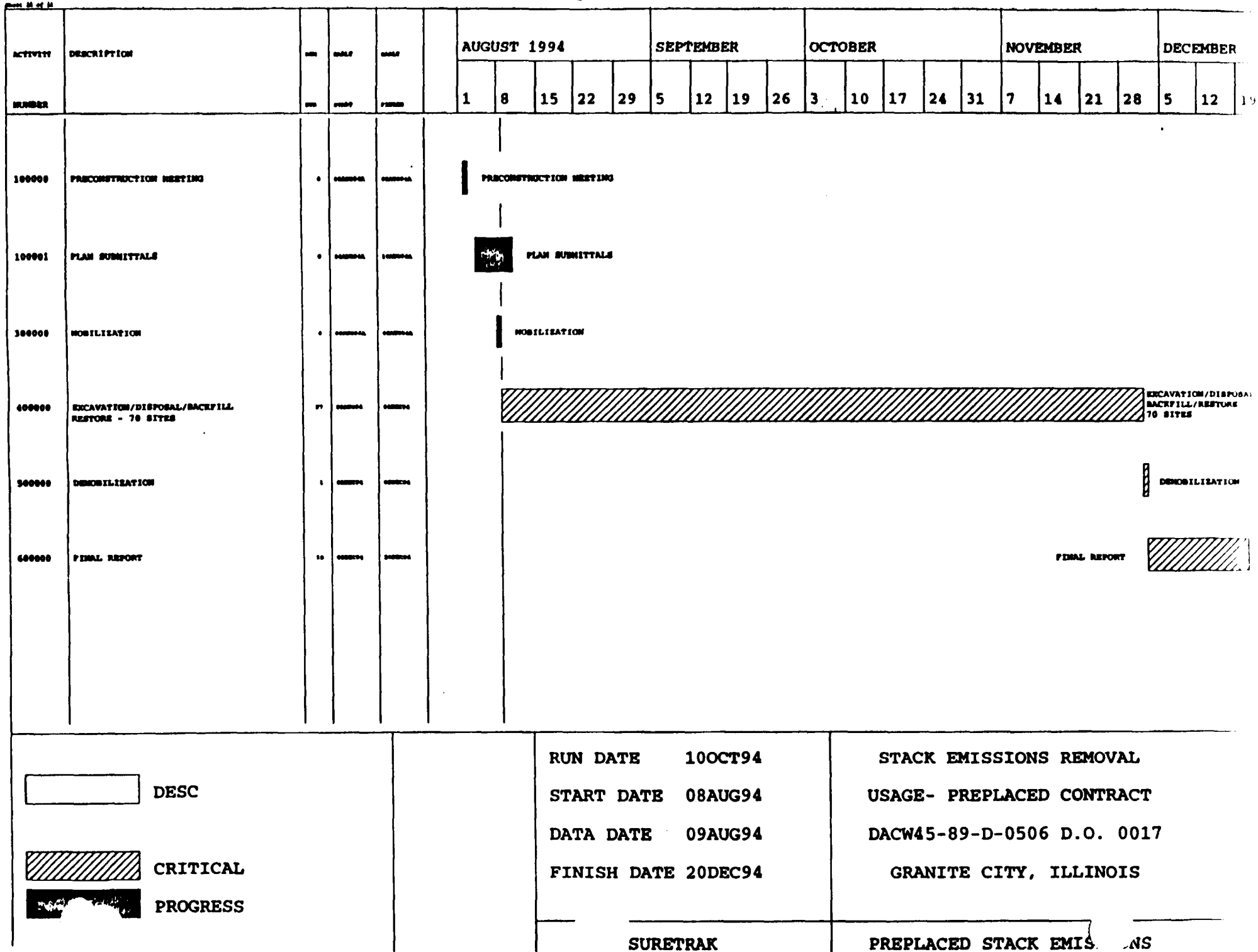
OHM's transportation and disposal coordinator will submit all relevant supporting documentation such as analytical reports and material safety data sheets (MSDS) with the above-mentioned documents, accompanied with a cover letter which describes the logic by which specific waste disposal alternatives are suggested by OHM to USACE. OHM will not ship any wastes without prior approval and signature of waste manifests by USACE on behalf of the USEPA.

3.2 SCHEDULE MONITORING AND CONTROL

The work tasks will be performed according to the schedule developed for the project (see Figure 3.1). Any major modifications to the work plan will be submitted to USACE for review prior to the actual implementation of the modification.



Figure 3.1



The schedule will be monitored and controlled in conjunction with the tracking of costs through the use of computerized cost/resource tracking and project management techniques developed by OHM.

3.3 PRECONSTRUCTION ACTIVITIES

Preconstruction activities for this project include the following items:

- ▶ Attending a preconstruction meeting with USACE
- ▶ Issuing subcontracts for subcontracted work that can be defined prior to initiation of the project
- ▶ Communicating with JULIE (utility locates) to locate potential underground utilities at the sites
- ▶ Obtaining permits as needed
- ▶ Videotaping and taking photos of residential property so that they can be properly restored following completion of the project

OHM understands that USACE will arrange for access agreements to the contaminated areas from the USEPA and adjoining land owners as necessary.

3.4 CONSTRUCTION ACTIVITIES

The primary construction activities for this project include the following:

- ▶ Mobilization of personnel and equipment
- ▶ Site preparation of the excavation area including temporary fencing and signs
- ▶ Excavation of contaminated soil
- ▶ Visual and/or analytical determinations of removal criteria fulfillment
- ▶ Backfill and compaction
- ▶ Paving and/or landscaping

3.4.1 Site Preparation

Site preparation includes the placement of a support office trailer and the establishment of support zones, decontamination stations, and exclusion zones.

The office will be set up in buildings owned by the USACE located at the former USACE maintenance facility. A support trailer will also be set up next to the USACE facility to provide sufficient work area for OHM accountants, purchasing, health and safety, and transportation personnel. Electrical power is already available at this site, and telephone lines will be arranged by OHM.



Many areas, mainly in Eagle Park, will need to be grubbed prior to excavation. An advance crew with appropriate equipment such as brush-hogs will clean and prepare these locations when required.

Dust control will be a major effort. A water truck equipped with a storage tank will be available at all times to prevent fugitive emissions. Water from decontamination sources will be recycled this way. The truck will continually fill site located storage tanks for each excavation crew.

All sampling equipment utilized at the locations will be decontaminated according to the procedures described in the CDAP.

3.4.2 Site Excavation

Each of the 70 locations has unique characteristics that mandate particular methodologies of remediation. But, in general, the locations can be separated into two categories:

- ♦ Residential yards
- ♦ Alleys/driveways/parking lots

Residential Areas

Most of the residential yards that need to be remediated will include the removal of sod and a varying depth of soil. These wastes will be excavated using a small tracked excavator, backhoe, and/or a Bobcat. At some locations, hand digging will be necessary. The largest piece of equipment that can be utilized given the logistics of the location will be used. After removal of soil to the predetermined depth, the residences will be backfilled, compacted by excavation equipment in 8-inch lifts, and landscaped to match their pre-remediation flora and appearance.

3.5 WASTE TRANSPORTATION AND DISPOSAL

The nonhazardous wastes identified by the WOODWARD-CLYDE data will be loaded into trailers for direct shipment to an approved, permitted nonhazardous landfill (Chain of Rock Landfill, Granite City, Illinois, or Roxana Landfill, Roxana, Illinois are currently approved).



4.0 SUBCONTRACTOR MANAGEMENT

OHM plans to manage any procurement under this project as a traditional prime/subcontractor relationship. This includes formal subcontract agreements, fixed-price procurement, and defined work packages. OHM anticipates subcontracting transportation and disposal and laboratory analysis.

The subcontractor will report directly to the project manager or assigned designate. The project manager will also approve any reports generated by the subcontractor prior to delivery to USACE.

OHM will formally report on subcontractor activities at intervals specified in the delivery order or as subsequently agreed upon. At this time, USACE only requires a final report and the QC Daily Report. The reports will include the following:

- Narrative of work accomplished
- Obstacles or challenges and how they were overcome
- Percent of work complete
- Estimated time to completion
- Other information, as required

OHM recognizes that delivery of materials or services to the location is often a critical-path activity. Monitoring and controlling issued purchase orders are necessary to ensure timely completion within the estimated budget.

Purchases of materials are anticipated for this project. Monitoring for delivery is the responsibility of the project accountant (PA), who maintains a master log of issued purchase orders, scheduled deliveries, and actual deliveries. The PA will notify the site supervisor, project manager, and other key project staff members of any delinquencies. Normally, the PA will also telephone the supplier for a status report.

If the situation is not immediately corrected, the project manager will contact OHM's contracts administrator and purchasing department to develop and implement a corrective action plan. The corrective action plan will include invoking penalties in the subcontract or canceling the original purchase order and issuing a new purchase order to a different supplier.



5.0 PROJECT TEAM AND ORGANIZATION

The major positions and individuals responsible for this project are as follows:

- ▶ Deputy Program Manager: Tyler Vassar
- ▶ Project Manager: Larry Hoffman
- ▶ Site Supervisor: Tom Seem

OHM will select other individuals from its staff for the following positions: truck driver, site-safety officer, transportation and disposal coordinator, procurement specialist, chemist, recovery technician, equipment operator, and operations foreman.



APPENDIX A

CONTRACTOR DATA ACQUISITION PLAN

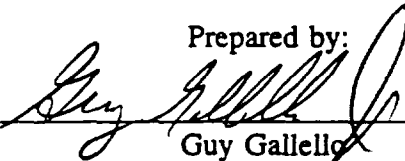
**CHEMICAL DATA ACQUISITION
PLAN FOR REMEDIATION OF LOCATIONS
IN GRANITE CITY, MADISON, AND
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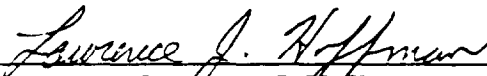


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Midwest Region

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October 7, 1994
Project 16473.1

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APPENDIX B - SITE SAFETY HEALTH PLAN
APPENDIX C - WASTE MANAGEMENT PLAN
APPENDIX D - CONTINGENCY PLAN



1.0 INTRODUCTION

The United States Army Corps of Engineers (USACE) has tasked OHM Remediation Services Corp. (OHM), a wholly owned subsidiary of OHM Corporation, under the Preplaced Remedial Action Contract No. DACW45-89-D-0506, Delivery Order No. 0017, to perform removal of lead contaminated soil associated with the NL Industries/Taracorp Superfund site (NL Site) in Granite City, Madison, and Venice, Illinois.

This Chemical Data Acquisition Plan (CDAP) describes OHM's responsibilities with respect to the sampling and analysis associated with this work effort. It is intended to be a site-specific guide for the field team for the project required sampling and analysis. The CDAP details all field activities, laboratory activities, and documentation related to the chemical data generated during the site activities.

In accordance with the Site Specific Advanced Agreements (SSAA) this CDAP only addresses the sampling and activities to be performed with respect to verification of the viability of the backfill burrow source and possible decontamination water sampling.

1.1 SITE HISTORY

The NL Site includes the NL Industries/Taracorp Plant, a former secondary lead smelting operation located at 16th Street and Cleveland Boulevard in Granite City, Illinois. Prior to 1903, the plant included various smelting related equipment. From 1903 to 1983, secondary lead smelting occurred on site. These activities were discontinued in 1983, and the equipment was dismantled.

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NL Industries, as former owner of the site, voluntarily entered into an Agreement and Administrative Order by Consent with the United States Environmental Protection Agency (USEPA) and IEPA in May 1985 to implement a Remedial Investigation/Feasibility Study



(RI/FS) for the site and other potentially affected areas. Taracorp was not a party to the agreement because it filed for bankruptcy. The USEPA determined that the site was a Comprehensive Environmental Responsibility and Cleanup Liability Act (CERCLA) facility, and it was placed on the National Priorities List on June 10, 1986.

1.2 PROJECT DESCRIPTION

This action requires the excavation and disposal of fill material placed in alleys, parking lots, driveways, and yards in residential communities. The communities include Granite City, Madison, and Venice, Illinois. The Record of Decision (ROD) established the action levels for this project at 500 parts per million (ppm). Following the removal of the contaminated material, the impacted areas will be restored. This restoration will include sodding the yards and paving the alleys, driveways, and parking lots.



2.0 OBJECTIVES

The objective of this effort is to excavate and dispose of the contaminated soil. Sampling and analytical activities will be required to perform this task.

2.1 DATA TYPES

The types of data collected will be:

- ▶ Decontamination water--Chemical analyses of decontamination water will be performed to establish and verify a profile for disposal purposes
- ▶ Backfill sampling--Off site chemical analyses will be performed on the soil

2.2 DATA USE

The data collected from each of the sampling or monitoring activities will be:

- ▶ Decontamination water--To characterize decontamination fluids for disposal or treatment
- ▶ Backfill sampling--To assure any off-site backfill used is uncontaminated

2.3 DATA QUANTITY NEEDS

The data quantity needs for each of the sampling, analysis, and monitoring activities are listed in Table 2.1.

TABLE 2.1 DATA QUANTITY NEEDS	
Task	Quantities
	Off-site
Decontamination water	1 - from aqueous & isopropanolic wastes at completion of site activities, to be used for dust suppression as per work plan sections 2.4.2 and 2.5.1
Backfill	3--1 from each source



2.4 DATA QUALITY NEEDS

The data quality needs of each analytical task are presented in Table 2.2. The samples collected and analyzed will verify that the backfill soil used is not contaminated. Specific Precision, Accuracy, Compatibility, and Completeness (PARCC) parameters for each method can be found in the laboratory Quality Assurance Program Plan (QAPP) in Exhibit I.

TABLE 2.2 DATA QUALITY NEEDS			
Sampling Task	Analytical	Data Quality Objective	Data Objective Completeness
Backfill	TAL, TCL, TCLP/Metals TPHC	USEPA Level III	All lab goals to be met



3.0 PROJECT ORGANIZATION

The project management organization is based on the specific project requirements. The project team members and their responsibilities are listed in Section 3.1 below.

The project manager is the primary focal point for control of the project activities. The project manager will be supported by the program management support team which will provide reviews, guidance, and technical advice on project execution issues. Members of this staff will be called on an "as-needed" basis to assist in smooth project execution. The project manager will be supported by a supervisory, health and safety, and quality assurance/quality control (QA/QC) staff to ensure that the project is safely executed in compliance with all applicable laws, regulations, statutes, and industry codes.

3.1 PROJECT ORGANIZATION AND RESPONSIBILITIES

The responsibilities of the key members in the project organization are as follows.

3.1.1 Project Manager, Lawrence Hoffman

The project manager is responsible for the overall direction of this project, which is executed under his supervision. The project manager provides the managerial administrative skills to ensure that resource allocations, planning, execution, and reporting meet contract requirements. The project manager is ultimately accountable for all work activities on this project. The individual responsibilities of the project manager can include, but are not limited to, the following:

- ▶ Selection of a resource manager
- ▶ Participation in project QA reviews
- ▶ General supervision of the project
- ▶ Approval, as required, of project-specific QA documents
- ▶ Approval of procurement documents
- ▶ Stopping work on a project if necessary because the project cannot be completed to the required quality levels, the schedule, or budget to permit successful completion
- ▶ Communication to the project staff of project-specific client and regulatory requirements



- ▶ Identification, documentation, and notification of the contracting officer and project staff of changes in the scope of work (SOW), regulatory requirements, or QA practices

3.1.2 Site Supervisor, Tom Seem

The site supervisor will be the on-site operational manager of the project and is responsible for its day-to-day execution. He is in charge of the on-site operational and technical staff. He is responsible for maintaining clear, effective, up-to-date communication with the contracting officer concerning project scoping and planning. Responsibilities include coordination of subcontractors, including their compliance with OHM policies and procedures and contractual requirements; implementing and maintaining all site-specific plans; and controlling cost and schedule aspects of all site activities. Some of the quality-related responsibilities for the site supervisor include:

- ▶ Notifying the project manager if the project cannot be completed or completed with regard to quality, schedule, or cost
- ▶ Determining that changes, revisions, and reworks are required of the work plan or CDAP
- ▶ Serving as the final reviewer prior to release of project information to the client

3.1.3 Health and Safety Officer, (to be assigned)

The health and safety officer will be primarily responsible for:

- ▶ Assessing the potential health and safety hazards at the site
- ▶ Developing/implementing site-specific health and safety plans
- ▶ Performing periodic safety audits

3.1.4 Senior Project Chemist/QA Officer, Guy Gallelo Jr.

The senior project chemist will serve as Project QA Officer and will:

- ▶ Track validation data and ensure adherence to published guidelines
- ▶ Determine if the levels of QA are being met for the project
- ▶ Certify the level of QA that has been achieved during the generation of analytical data



- ▶ Participate in project QA reviews
- ▶ Implement QA/QC procedures
- ▶ Manage the inter-laboratory auditing program during field projects
- ▶ Assure the traceability of all standards to primary standards
- ▶ Stop work if quality objectives are not being met

3.1.5 Senior Technologist, Doug Zimmer

The senior technologist will:

- ▶ Manage all aspects of project sampling tasks
- ▶ Ensure compliance with project CDAP
- ▶ Generate daily reports to project and USACE staff
- ▶ Generate weekly reports to the manager of sample technologists

3.1.6 Manager Sample Technologists/Sampling QA Officer, Lisa Schwan

This individual will:

- ▶ Determine if levels of sampling QA are consistent with project goals
- ▶ Perform audits of sampling QA activities

3.2 ANALYTICAL LABORATORIES

OHM has selected a USACE-approved and OHM-certified laboratory to perform all off site analysis. The QAPPs for these two laboratories are included as Exhibit I.

The primary laboratory is:

ECC
5235 Omni Drive
Cincinnati, OH
513-752-2950
Contact: Dr. Mona Risk

Note: ECC has separated from EHRT and has become a free standing laboratory no longer associated with EHRT.



4.0 FIELD ACTIVITIES

This section describes the various procedures that will be used in the field to meet the project objectives. Table 4.1 outlines the activities.

4.1 BACKFILL

To complete the backfill activities, OHM will follow these steps;

- ▶ Determine and document pile location for each backfill source
 - Use any appropriate benchmark
 - Determine the location of the northeast corner of the source stockpile
 - Place a stake at this point
- ▶ Determine pile dimensions
 - Measure from the stake positioned previously and measure the pile dimensions as if in a box (see Figure 4.2)
 - Estimate the pile height
- ▶ Determine and mark sample locations
 - Refer to Figure 4.1 and select locations for sample points, in each quadrant
 - Mark the sample points with stakes
- ▶ Document sample point locations
 - Use the benchmark and measure north/south and east/west only
- ▶ Decontaminate equipment
 - Stainless-steel mixing bowl
 - Stainless-steel spatula
 - Shovel



TABLE 4.1**OBJECTIVES, STRATEGIES, AND
METHODOLOGIES OF SAMPLING**

Objective	Strategy	Methodology	No. of Samples	Container and Volume	Analysis	Preservation
Backfill Sample	Grabs and Composites	Shovel/Trowel	4 grabs 1 composite from each source	4, 4-ounce 2, 16-ounce For all source	TAL, TCL TCLP/METALS, TRPH	Cool 4°C

- ▶ In each quadrant
 - Obtain samples at the five points
 - Select one for a 4-ounce grab with no headspace; volatile samples will be based on high head space readings.
 - Place two shovels of material into the bowl
 - Composite shoveled samples using the mixing and quartering technique until 32 ounces remains
 - Transfer to 2, 16-ounce jars
 - Label jars according to Table 4.2, complete chain-of-custody (COC), and prepare for transport to the subcontracted laboratory. Four composites per backfill source for a total of twelve samples will need to be obtained.

TABLE 4.2				
SAMPLING OF STOCKPILED OVERBURDEN AND BACKFILL				
Container Size	Number of Samples	Matrix	Analysis	Sample Number Prefix
4-ounce	4 (1 grab from each quadrant)	Soil	Volatile TCL	10,000
16-ounce	4 (composite sample from each quadrant)	Soil	Semivolatile TCL, TAL, TCLP/metals TRPH	10,000

4.2 DECONTAMINATION RINSATES

No sampling of the decontaminated water is required since it will be consumed for dust suppression.



5.0 DOCUMENTATION

OHM will maintain a strict documentation system for tracking and identifying samples. The documentation program will include at a minimum: procedures for labeling, completion of COC documents, and permanently bound field sampling notebooks.

5.1 SAMPLE LABELING

Correct sample labeling and the corresponding notation of the sample identification numbers in the field logbook are necessary to prevent misidentification of samples. All sample labels will be completed legibly with waterproof indelible ink. The completed label will be affixed to the sample bottle and covered with clear tape. All sample labels will include, at a minimum, the following information:

- ▶ Job Number
- ▶ Sample Number
- ▶ Date - Month, Day, and Year
- ▶ Time - Military time (1000, 1400, 2300)
- ▶ Sample - Description of sample (include matrix and point of sample)
- ▶ Analyte - Analysis which will be performed
- ▶ Taken By - Initials of person taking sample
- ▶ Witness - Initials of person witnessing or assisting in taking the sample

See Figure 5.1 for an example of an OHM sample label.

FIGURE 5.1

SAMPLE LABEL

JOB #: <u>16473</u>	SAMPLE #: <u>16473-20001</u>
DATE: <u>8/01/94</u>	TIME: <u>1615</u>
SAMPLE: <u>Brown opaque soil sample</u>	
TAKEN BY: <u> BW </u>	
WITNESS: <u> WP </u>	



5.2 FIELD LOGS

OHM will record information from the site survey and sample collection activities in the sampler's field logbook. The log will be a diary of the sampler's activities and will contain the following standard columns:

- ▶ Sample Number
- ▶ Date: Date sample was obtained
- ▶ Time: Military time sample was obtained
- ▶ Description of Sample: Physical description of sample (e.g., clear red, organic/cloudy, aqueous/brown sludge, or light sandy soil)
- ▶ Location: Description of area sampled (abbreviated form if sampled twice or more--log explaining locations and abbreviations should be attached to or written in front of the logbook)
- ▶ Sampler's Initials: Person obtaining sample (usually two, at least one witnessing if not involved in actual sampling task)
- ▶ Volume: Size of sample (8 ounce, 32 ounce, etc.)
- ▶ Analysis Required: The analysis required (or requested) for each sample
- ▶ Results: Will vary according to project requirements; should be stated in consistent units (parts per million [ppm], parts per billion [ppb], etc.) when possible
- ▶ Chain-of-Custody Number: COC number for the COC that relinquishes custody of a particular sample
- ▶ Additional Comments: Space reserved for any other information concerning particular sample or special procedure or analysis

5.3 CHAIN-OF-CUSTODY

The COC will be maintained for all samples collected during this project. It is very important that the information on the COC record form match the information on the sample bottles. COC procedures will be in accordance with USEPA procedures. The COC forms will be completed (see Figure 5.2), enclosed in a plastic Ziplock bag, and taped to the underside of the lid of the shipping containers utilized.





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FIGURE 1
CHAIN-OF-CUSTODY RECORDForm 0019
Field Technical Services
Rev. 08/89

Nº 125594

O.H. MATERIALS CORP. • P.O. BOX 551 • FINDLAY, OH 45830-0551 • 419-423-3526

PROJECT NAME		PROJECT LOCATION		NUMBER OF CONTAINERS	ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS)										REMARKS	
U.S. Army Corp. of Engineers		Granite City, Illinois														
NO. NO.	PROJECT CONTACT	PROJECT TELEPHONE NO.														
16473	Tom Seem	618-876-8406														
CLIENT'S REPRESENTATIVE		PROJECT MANAGER/SUPERVISOR														
Tom Bloodworth		Larry Hoffman														
ITEM NO.	SAMPLE NUMBER	DATE	TIME	COMP	GRAB	SAMPLE DESCRIPTION (INCLUDE MATRIX AND POINT OF SAMPLE)										REMARKS
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
TRANSFER NUMBER	ITEM NUMBER	TRANSFERS RELINQUISHED BY		TRANSFERS ACCEPTED BY		DATE	TIME	REMARKS								
1																
2																
3																
4								SAMPLER'S SIGNATURE								

LAB COPY

5.4 SAMPLE NUMBERING

The following types of samples are anticipated. Each sample from each of the categories below will be numbered using the prefix, followed by the OHM project number and, if necessary, the grid position identifier and a sampling sequence identification code. The sample numbers will be recorded in a sample logbook.

Sample Type	Prefix
(a) Backfill source	10,000
(b) Decontamination fluid samples	20,000



6.0 SAMPLE PACKAGING AND HANDLING

Procedures for sample handling, packaging, and documentation are presented in this section. The methodology used by OHM will follow all applicable USACE guidelines for sample packaging, shipping, and COC.

6.1 SAMPLE PACKAGING AND HANDLING

The samples will be placed in appropriately labelled, pre-cleaned sample containers, and enclosed within one plastic Ziplock bag. The bottom of the metal, or equivalent strength plastic shipping cooler will be lined with bubble pack material. A sufficient quantity of ice will then be placed on the bubble pack material to cover the bottom of the cooler. All ice utilized inside the cooler will be containerized within two plastic freezer bags of 1 quart or larger in size. All four sides of the cooler will then be lined with ice packs. Each sample container will be wrapped with bubble pack material to prevent breakage. The wrapped containers will then be placed in the space created from the placement of the ice. Any remaining void space will then be filled with bubble pack to prevent movement of the sample containers during transport. Once the samples are secured, ice will be placed on top of the sample containers, thereby completely surrounding the sample containers with ice packs. The remaining headspace in the cooler, if any, will then be filled with bubble pack. Precautions will be taken to assure that the sample labels remain intact and legible (see Figure 6.1).

Prior to the sealing of the cooler, an OHM Shipment Check List will be reviewed for completion. The check list is a tool utilized by OHM to standardize sample packaging procedures during field operations. An example of the list is supplied (see Figure 6.2).

The completed COC forms will be enclosed in plastic Ziplock bags and taped to the underside of the lid of the cooler. The drain of the cooler will be taped shut. On the day of shipment, fresh ice will be added to the coolers to ensure the preservation criteria is met, the lid will be taped shut, and four custody seals or evidence tape will be fixed to the coolers. The coolers will then be shipped to the designated laboratory. For liquid samples, a "THIS SIDE UP" placard is required.

Samples will be sent to ECC for various turnaround times, so sample collection, shipping, and analytical processes are completed within the required maximum holding times (see Section 7.0, Analytical Methods). Samples taken for this project will be considered low-level environmental samples for packaging and shipping purposes. No sample will be held on site by OHM for more than 24 hours.

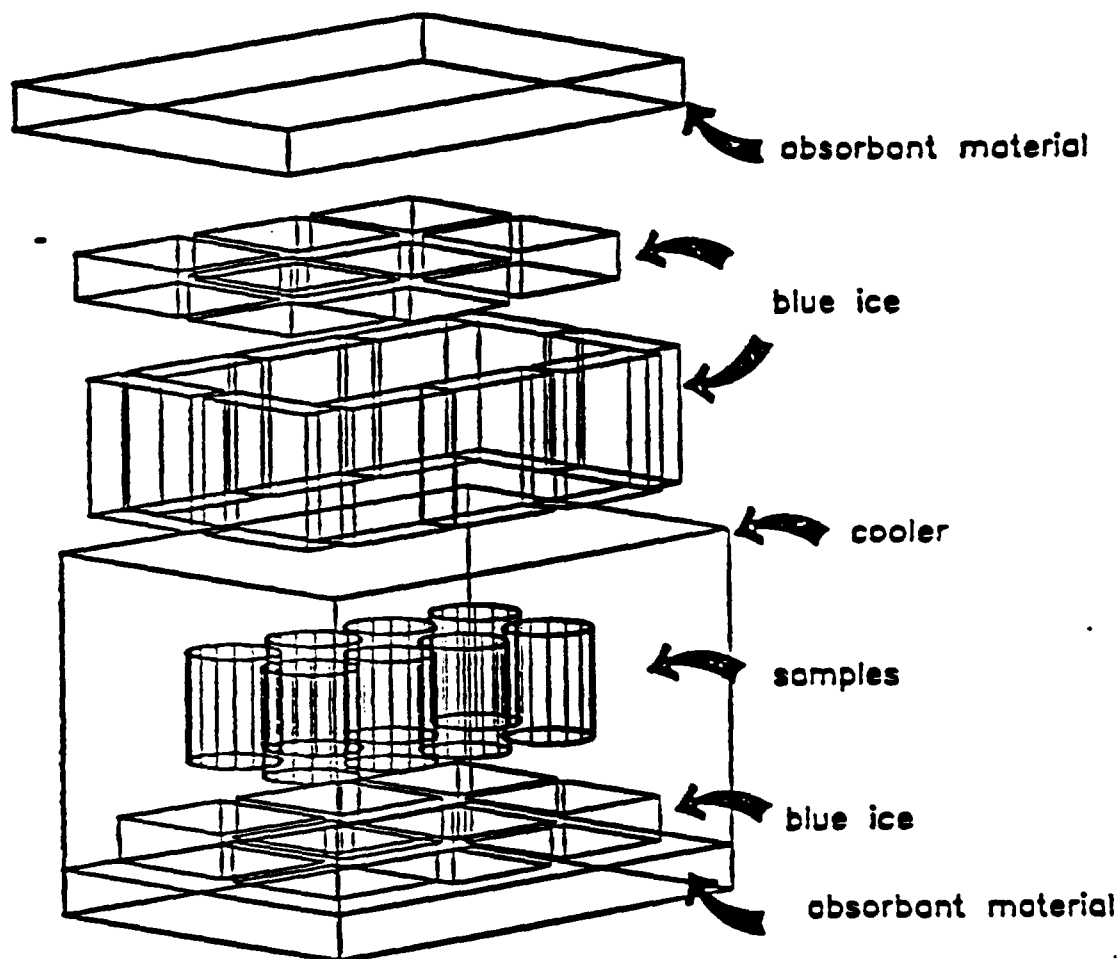


Figure 6.1



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GUIDANCE FOR SAMPLE PACKAGING,



INSTRUCTIONS

Line the bottom of the cooler with absorbent material such as Sorbant Pads. Place enough blue ice packs on the absorbent material to cover the bottom. Line all four sides of the cooler with blue ice.

Place no more than eight 1-liter samples in the center of the blue ice. Place absorbent material around the samples to avoid breakage.

Place enough blue ice packs to cover the top of the samples.

Fill the head space of the cooler with absorbent material.

Complete the OHM SHIPMENT CHECK LIST FORM prior to sealing cooler.

ICE MAY BE SUBSTITUTED FOR THE BLUE ICE BUT PRECAUTIONS MUST BE TAKEN TO KEEP SAMPLES REMAIN INTACT AND LEGIBLE.

Figure 6.2



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SHIPMENT CHECK LIST

PROJECT NAME _____

PROJECT No.: _____

STREET ADDRESS _____

DATE: / / TIME: _____

CITY/STATE/ZIP _____

PHONE NUMBER () - _____

FAX NUMBER: () - _____

SAMPLE CHECK LIST

	YES	NO	COMMENTS
SAMPLE LIDS ARE TIGHT AND CUSTODY SEALS IN PLACE?	<input type="checkbox"/>	<input type="checkbox"/>	_____
ARE ALL SAMPLE NUMBERS, DATES, TIMES AND OTHER LABEL INFORMATION LEGIBLE AND COMPLETE?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAS ALL SAMPLE NUMBERS, DATES, TIMES AND OTHER SAMPLING DATA BEEN LOGGED INTO THE SAMPLE LOG BOOK?	<input type="checkbox"/>	<input type="checkbox"/>	_____
DO SAMPLE NUMBERS AND SAMPLE DESCRIPTION ON THE LABELS MATCH WITH THOSE ON THE COC?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAVE THE SAMPLES BEEN PROPERLY PRESERVED?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAVE THE CHAIN OF CUSTODIES BEEN FILLED OUT COMPLETELY AND CORRECTLY?	<input type="checkbox"/>	<input type="checkbox"/>	_____
DOES THE ANALYTICAL SPECIFIED ON THE COC MATCH THE ANALYTICAL SPECIFIED IN THE SCOPE OF WORK?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAVE THE COC'S BEEN PROPERLY SIGNED IN THE TRANSFER SECTION?	<input type="checkbox"/>	<input type="checkbox"/>	_____

PACKAGING CHECK LIST

	YES	NO	COMMENTS
HAS EACH SAMPLE BEEN PLACED INTO AN INDIVIDUAL PLASTIC BAG?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAS THE DRAIN PLUG OF THE COOLER BEEN TAPED CLOSED WITH WATER PROOF TAPE FROM THE INSIDE?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAS THE BOTTOM OF THE COOLER BEEN LINED WITH AT LEAST THREE INCHES OF CUSHIONING ABSORBANT PADS?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAVE ALL SAMPLES BEEN PLACED INTO THE COOLER IN AN UPRIGHT POSITION?	<input type="checkbox"/>	<input type="checkbox"/>	_____
IS THERE ADEQUATE SPACING OF SAMPLES SO THAT THEY WILL NOT TOUCH DURING SHIPMENT?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAVE AN ADEQUATE NUMBER OF BLUE ICE PACKS BEEN PLACED AROUND AND ON TOP OF THE SAMPLES?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAS FRESH BLUE ICE BEEN ADDED TO THE COOLER THE DAY OF SHIPMENT?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAS THE COOLER BEEN FILLED WITH ADDITIONAL CUSHIONING MATERIAL?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAS THE COC BEEN PLACED IN A ZIPLOCK BAG AND TAPED TO THE INSIDE OF THE LID OF THE COOLER?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAVE CUSTODY SEALS BEEN PLACED ONTO THE LID?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAS THE COOLER BEEN LABELED "THIS SIDE UP"?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAS THE COOLER BEEN LABELED WITH THE DOT PROPER SHIPPING NAME, UN/NA NUMBER AND PLACARD?	<input type="checkbox"/>	<input type="checkbox"/>	_____
HAS THE LABORATORY PERFORMING THE ANALYSES BEEN NOTIFIED OF THE SHIPMENT OF SAMPLES?	<input type="checkbox"/>	<input type="checkbox"/>	_____

PROBLEMS/RESOLUTIONS: _____

PREPARED BY: _____

SIGNATURE: _____

7.0 ANALYTICAL METHODS

7.1 SUBCONTRACT LABORATORY ANALYTICAL METHODS

7.1.1 Backfill Source Samples

The backfill soil will be analyzed for the contract laboratory program (CLP) TAL metals parameter list. USEPA Method 6010 will be used for most of this analysis. Mercury will be analyzed by USEPA Method 7471. Three metals, arsenic, lead, and selenium will require analysis by the appropriate USEPA Graphite Furnace methods if the level detected via inductively coupled argon plasma spectrophotometer (ICAP) is less than twice the ICAP instrument detection limit (IDL). All digestion will be performed according to USEPA Method 3050. Cyanide will be analyzed by USEPA Method 9010. All soil results will be reported on a dry-weight basis.

TABLE 7.1 TAL METALS ANALYSIS		
Parameter	Reference Method	Contract Required Detection Limit (CRDL) (may be affected by matrix)
Aluminum	SW-846 6010	200 micrograms per kilogram (ug/kg)
Antimony	SW-846 6010	60 ug/kg
Arsenic	SW-846 6010 (7060 if concentration < 2x ICAP IDL)	10 ug/kg
Barium	SW-846 6010	200 ug/kg
Beryllium	SW-846 6010	5 ug/kg
Cadmium	SW-846 6010	5 ug/kg
Calcium	SW-846 6010	5,000 ug/kg
Chromium, total	SW-846 6010	10 ug/kg
Cobalt	SW-846 6010	50 ug/kg
Copper	SW-846 6010	25 ug/kg



**TABLE 7.1
TAL METALS ANALYSIS**

Parameter	Reference Method	Contract Required Detection Limit (CRDL) (may be affected by matrix)
Cyanide (total/amenable)	SW-846 9010	500 ug/kg
Iron	SW-846 6010	100 ug/kg
Lead	SW-846 6010 (7421 if concentration < 2x ICAP IDL)	10 ug/kg
Magnesium	SW-846 6010	5,000 ug/kg
Manganese	SW-846 6010	15 ug/kg
Mercury	SW-846 7471	0.2 ug/kg
Nickel	SW-846 6010	40 ug/kg
Potassium	SW-846 6010	5000 ug/kg
Selenium	SW-846 6010 (7740 if concentration < 2x ICAP IDL)	5 ug/kg
Silver	SW-846 6010	10 ug/kg
Sodium	SW-846 6010	5,000 ug/kg
Thallium	SW-846 6010	10 ug/kg
Vanadium	SW-846 6010	50 ug/kg
Zinc	SW-846 6010	20 ug/kg



7.1.2 TCL Volatile Organics

The backfill will be analyzed for the TCL Volatile Organics list by USEPA Method 8240. Detection will be to the CLP low soil/sediment levels. All results will be reported on a dry-weight basis. Table 7.2 summarizes this analysis.

TABLE 7.2 TCL VOLATILE ORGANIC ANALYSIS	
Parameter	CRDL or Desired Limit (Matrix Dependent)
Acetone	10 ug/kg
Benzene	5 ug/kg
Bromodichloromethane	5 ug/kg
Bromoform	5 ug/kg
Bromomethane	5 ug/kg
2-Butanone	10 ug/kg
Carbon disulfide	5 ug/kg
Carbon tetrachloride	5 ug/kg
Chlorobenzene	5 ug/kg
Chlorodibromomethane	5 ug/kg
Chloroethane	5 ug/kg
Chloroform	5 ug/kg
Chloromethane	5 ug/kg
Dibromochloromethane	5 ug/kg
1,1-Dichloroethane	5 ug/kg
1,2-Dichloroethane	5 ug/kg
1,1-Dichloroethene	5 ug/kg
trans-1,2-Dichloroethene	5 ug/kg
1,2-Dichloropropane	5 ug/kg
cis-1,3-Dichloropropene	5 ug/kg
trans-1,3-Dichloropropene	5 ug/kg



TABLE 7.2
TCL VOLATILE ORGANIC ANALYSIS

Parameter	CRDL or Desired Limit (Matrix Dependent)
Ethyl Benzene	5 ug/kg
2-Hexanone	10 ug/kg
Methylene Chloride	5 ug/kg
4-Methyl-2-pentanone	10 ug/kg
Styrene	5 ug/kg
1,1,2,2-Tetrachloroethane	5 ug/kg
Tetrachloroethane	5 ug/kg
Toluene	5 ug/kg
1,1,1-Trichloroethane	5 ug/kg
1,1,2-Trichloroethane	5 ug/kg
Trichloroethane	5 ug/kg
Vinyl acetate	10 ug/kg
Vinyl Chloride	5 ug/kg
Xylene (total)	5 ug/kg

7.1.3 TCL Semi-Volatile Organics

To determine if potentially hazardous chemicals are present, the backfill soil will be analyzed by USEPA Method 8270 for the CLP TCL Semi-volatile Organics list. A total ion chromatogram (TIC) library search will also be performed during this analysis. Detection will be to the low soil/sediment levels and all results will be reported on a dry-weight basis. Table 7.3 summarizes this analysis.



TABLE 7.3
TCL SEMI-VOLATILE ORGANICS ANALYSIS

Parameter	Contract Required Quantitation Limit (CRQL) (ug/kg)
Acenaphthene	330
Anthracene	330
Benzidine	330
Benzoic acid	1,600
Benz(a)anthracene	330
Benzo(b)fluoranthene	330
Benzo(k)fluoranthene	330
Benzo(g,h,i)perylene	330
Benzo(a)pyrene	330
Benzyl alcohol	330
Bis(2-chloroethoxy)methane	330
Bis(2-chloroethyl) ether	330
Bis(2-chloroisopropyl) ether	330
Bis-(2-ethylhexyl)phthalate	330
4-bromophenyl phenyl ether	330
Butyl benzyl phthalate	330
4-Chloraniline	330
4-Chloro-3-methylphenol	330
2-Chloronaphthalene	330
2-Chlorophenol	330
4-Chlorophenyl phenyl ether	330
Chrysene	330
Dibenz(a,h)anthracene	330
Dibenzofuran	330
Di-n-butyl phthalate	330



TABLE 7.3
TCL SEMI-VOLATILE ORGANICS ANALYSIS

Parameter	Contract Required Quantitation Limit (CRQL) (ug/kg)
1,2-Dichlorobenzene	330
1,3-Dichlorobenzene	330
1,4-Dichlorobenzene	330
3,3'-Dichlorobenzidine	660
2,4-Dichlorophenol	330
Diethylphthalate	330
2,4-Dimethylphenol	330
Dimethylphthalate	330
4,6-Dinitro-2-methylphenol	1,600
2,4-Dinitrophenol	1,600
2,4-Dinitrotoluene	330
Di-n-octyl phthalate	330
Fluoranthene	330
Fluorene	330
Hexachlorobenzene	330
Hexachlorobutadiene	330
Hexachlorocyclopentadiene	330
Hexachloroethane	330
Indeno(1,2,3-cd)pyrene	330
Isophorone	330
2-Methylnaphthalene	330
2-Methylphenol	330
4-Methylphenol	330
Naphthalene	330
2-Nitroaniline	1,600



TABLE 7.3
TCL SEMI-VOLATILE ORGANICS ANALYSIS

Parameter	Contract Required Quantitation Limit (CRQL) (ug/kg)
4-Nitroaniline	1,600
Nitrobenzene	330
2-Nitrophenol	330
4-Nitrophenol	1,600
N-Nitrosodiphenylamine	330
N-Nitroso-di-n-propylamine	330
Pentachlorophenol	1,600
Phenanthrene	330
Phenol	330
Pyrene	330
1,2,4-Trichlorobenzene	330
2,4,5-Trichlorophenol	1,600
2,4,6-Trichlorophenol	330

7.1.4 Total Petroleum Hydrocarbons

Soils will be analyzed for TPHC following USEPA Method 418.1

7.2 VALIDATION OF ANALYTICAL DATA

All subcontractor analytical data is extensively reviewed by OHM Midwest Field analytical Services as a function of the Midwest Regional Laboratory Program. OHM requires the subcontracted laboratory to follow the method as outlined in SW-846. All QA/QC that is required will be delivered to the USACE. Any samples which require splitting will be done by OHM. The split sample will be shipped per OHM shipping procedures to the MRD laboratory. This data review encompasses complete validation of all QC and data reporting issues. the OHM Project Manager is then provided a validation package along with the laboratory data package itself. No project decisions are allowed to be made prior to validation of subcontractor data by midwest Field Analytical Services.



8.0 CALIBRATION PROCEDURES

These sections outline the calibration procedures to be followed during the course of this project.

8.1 CALIBRATION OF FIELD INSTRUMENTATION

8.1.1. Field Screening Instrumentation

OHM field personnel will calibrate the field screening equipment according to prescribed OHM Standard Operating Procedures (SOPs) and the manufacturer's instructions. All calibration information will be entered into the Field Instrument Logbook. Calibration of field instrumentation will be performed at least once per day during project operations.

8.2 CALIBRATION OF SUBCONTRACTOR ANALYTICAL INSTRUMENTATION

The details of the subcontractor analytical laboratory procedures and policies regarding standard sourcing, standard preparation, and instrument calibration are contained in the subcontractor laboratory QAPPs, attached as Exhibit I to this CSAP.



EXHIBIT I

LABORATORY CAPABILITY QA/QC MANUAL

5-14



**ENVIRONMENTAL
CHEMICAL
CORPORATION**

QA/QC MANUAL

May 1994

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9.0 DECONTAMINATION PROCEDURES

Decontamination is accomplished to ensure that the contaminated materials which sampling equipment may have contacted during sampling activities are removed and therefore, do not contribute a significant background to the analytical results.

9.1 SAMPLING EQUIPMENT

All sampling equipment and tools to the greatest extent possible, will be disposable. All non-disposable sampling equipment used in obtaining samples should be precleaned and/or decontaminated by the following procedure:

- ▶ Wash with Alconox and water solution, brush to remove all large particles
- ▶ Rinse with tap water
- ▶ Rinse with deionized water
- ▶ Rinse with isopropanol, allow to air dry for 10 minutes
- ▶ Rinse with deionized water three times
- ▶ Air dry

9.2 SAMPLE CONTAINERS

Liquid waste generated during this project will be stored in open plastic containers to promote evaporation. Methanolic waste will be segregated from aqueous fluids, treated on site. OHM recognizes the need for generation of these wastestreams to be kept to a minimum throughout the project. Solid wastes shall be drummed and staged accordingly and disposed of in accordance with applicable state and federal regulations.



APPENDIX A

QUALITY ASSURANCE PROGRAM PLAN

OBJECTIVES

Quality Assurance at Environmental Chemical Corporation (ECC) advocates a program of practices that assures data to be of known and documented quality. The QA program requirements cover all the activities of its personnel which generate environmentally related measurement data, whether for research or monitoring purposes.

The objectives of the QA program are to assess, ensure, and document that all data collected, stored, reported or used by ECC are scientifically valid, defensible, and of known precision and accuracy. The ECC QA unit is headed by Ms. G. Luna who reports solely to the Director. Ms. Luna and the QA unit of ECC maintains liaison with the QA unit of the sponsor to assure that data comparability and QA communications affecting quality of the generated data are consistent with the sponsor QA requirements.

INSPECTIONS

The Quality Assurance Unit (QAU) inspects critical phases of each project conducted at ECC and maintains written, signed, and dated records of each inspection.

The suitability of a facility for the performance of both the technical and QA aspects of a task must be assessed prior to its use through a system audit by qualified QA personnel. These audits shall ascertain that the facility is adequate for the type of analysis to be performed under a specific project or contract. The following items are evaluated: the size of the laboratories, the hoods ventilation, the available bench space, the storage of chemicals, solvents, and standards, and the temperature and humidity control. In addition, the auditor will make sure that the utilities are meeting OSHA requirements: there is a source of pure water available, the glassware are cleaned according to EPA regulations, and the waste disposal is in compliance with the Federal Register.

Safety and health maintenance features must also be present, according to OSHA and NIOSH requirements.

For a specific project the audit will evaluate: the qualifications of the personnel, the availability of the proper instrumentation, its calibration and maintenance, the analytical methods and standard operating procedures followed, the quality control procedures and check samples, the data review, validation and assessment, and finally the data report and package.

An Audit or Inspection Form is designed for each project. Each unsatisfactory rating must be explained in full, following consultation with the appropriate technician, chemist, or supervisor. The Audit or Inspection Form and all comments contained in an appended inspection report must be signed and dated by each QAU member participating in the Inspection. A copy of the Audit or Inspection Form and any appended inspection report is given to the Director at the completion of the Inspection. The originals are kept with other Quality Assurance Records.

QAU RECORDS

All Quality Assurance records generated by the QA/QC Manager or by external auditors are maintained within the QAU with access strictly limited to QAU personnel. A file for each laboratory project conducted at ECC is maintained in a separate folder.

QAU RESPONSIBILITIES AND DOCUMENTATION

The responsibilities of the Quality Assurance Unit are numerous. The QAU will:

1. Review the sample and QC data for the analytical work conducted at ECC and prepare the data package and the final report for every completed project.
2. Review and update the SOPs.
3. Implement the update of the instrument or method detection limits for various analyses and parameters, and maintain a copy of the current detection limits.
4. Periodically inspect every phase of the laboratory function, maintain properly signed and dated records for every inspection, and provide the Director and Laboratory Manager with a written report for any problems or deficiencies encountered during the audit.
5. Assure that no deviation from approved SOPs are made without prior written authorization.
6. Update and maintain the personnel training files.
7. Be responsible for the blind Performance Evaluation Samples, the evaluation of the lab results, and maintain the results on file.
8. Organize the interlaboratory study, Round Robin (NIOSH, WS, WP, COE, CLP, etc...), and maintain the results on file.
9. Maintain an Archive which is the legally required repository of all documents.

STANDARD OPERATING PROCEDURES (SOPs)

The QAU develops SOPs for their auditing activities and their administrative functions while laboratory/facility SOPs are prepared by the scientific staff. The SOPs are prepared by the individual doing the activity, reviewed by the immediate supervisor, and reviewed and concurred by the QA/QC Manager. The SOPs are signed by the individual who prepared them and by the QA/QC Manager.

SOPs are written for the use of trained personnel, not for the purpose of training uninformed personnel. The SOPs are brief, using a standard format, using clear statements, and using correct English to avoid ambiguity. A correctly written SOP enables trained personnel to work independently, yet perform the procedure repeatedly in an identical manner.

The QAU is responsible for SOP distribution and maintains the SOP historical file.

Changes in SOPs can only be made with the written approval of Laboratory Management. Any changes in SOPs made without prior written authorization are reported to Laboratory Management as soon as noted by the QAU.

A revised SOP is signed by the person making the revision and initialed by the QA/QC Manager.

Standard Operating Procedures will address the following items:

1. Scope and application.
2. Policy.
3. Definitions.
4. Apparatus and material.
5. Reagents.
6. Procedures: Standard preparation, sample preparation, instrument calibration, and operation.
7. Quality control: QC samples, acceptable limits for QC samples and standards, tuning calibration check, etc....
8. Corrective action and responsibilities.
9. Documentation: Logbook, maintenance book, etc...
10. Calculation.
11. Miscellaneous notes.
12. References.
13. Safety.

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE/QUALITY CONTROL PROJECT PLAN

Title Page With Provisions for Approval Signatures

Project Title:

ECC Approvals

Contract Name

Mona Risk, Ph.D. Date
Director

Project Officer Date

G. Luna Date
QC Manager

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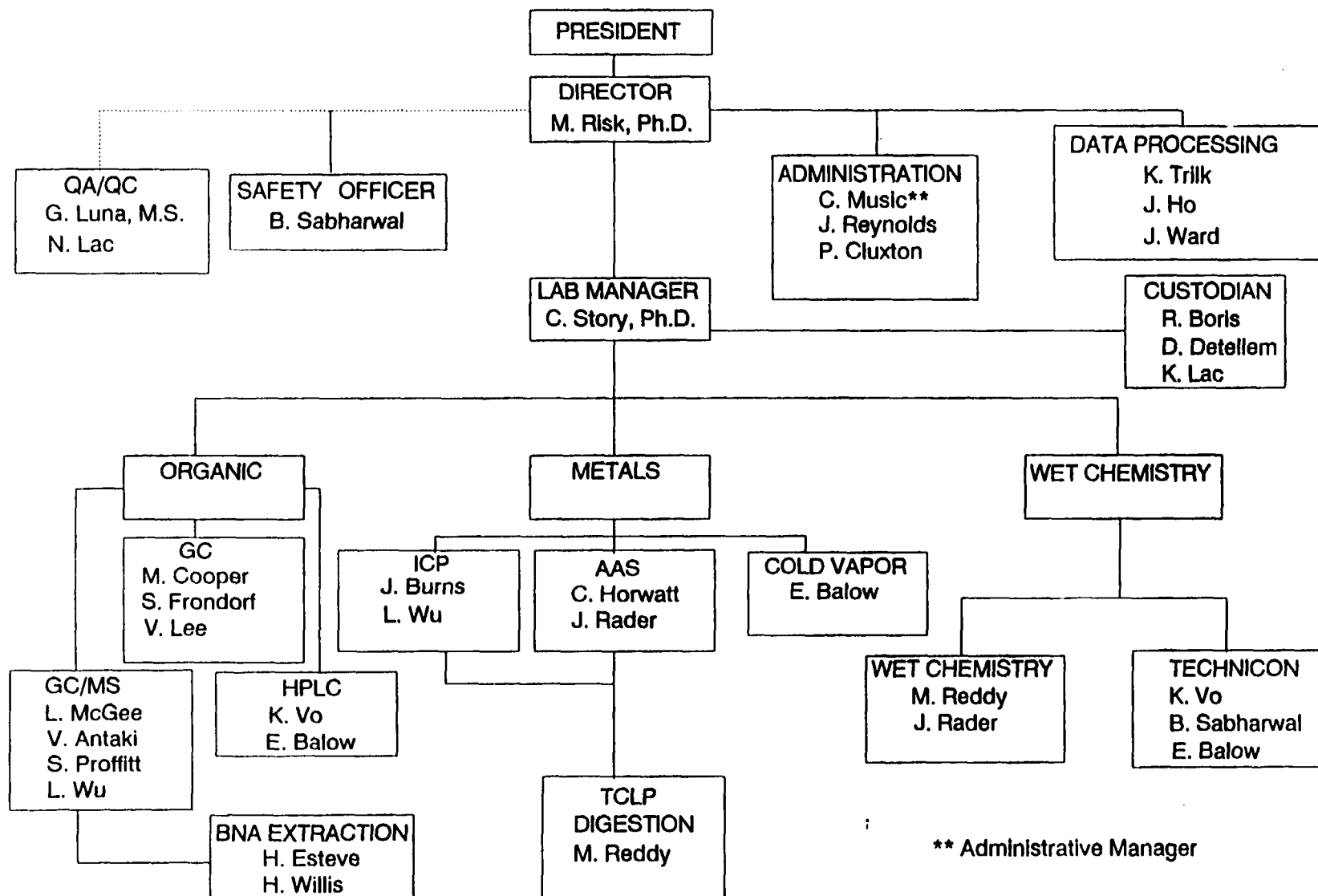
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ORGANIZATIONAL CHART

Cincinnati Laboratory



** Administrative Manager

3.0 ORGANIZATION AND RESPONSIBILITY

3.1 Director

Mona Risk, Ph.D.:

Dr. Risk is the Director of Chemistry at ECC and the Project Manager for all chemistry contracts. She is responsible for contract administration and management; resource planing; adherence to schedules and all reports. All information or questions should be directed to her.

Quality Control/Quality Assurance

Gina Luna, MS:

Ms. Luna is in charge of a Quality Assurance Unit (QAU) at ECC. The QAU reviews the results of the samples and the QC analyses, inspects the logbooks, and prepares the final report for each project.

The QAU conducts the lab audits, distributes the performance evaluation samples, regularly updates the personnel training file, the SOPs, the detection limits, etc., and maintains an archive for all official documents and reports.

3.2 Laboratory Manager

W. C. Story, Ph.D.:

Dr. Story is in charge of the analytical lab. Both organic and inorganic groups report to him. He trains and qualifies the personnel in specific analytical procedures. He helps maintain the analytical instrumentation and solves the technical or operational problems. He reviews all the raw data, field sample, and QC sample results. Any technical questions or sample analysis modification should be addressed to him.

3.3 Inorganic Analysis Group:

Supervisors - N. Lac
ICP Operator - J. Burns, L. Wu, C. Horwatt
Graphite Furnace Operator - C. Horwatt, J. Rader, L. Wu
Cold Vapor Analysis - J. Rader, E. Balow
Digestion, TCLP, EP Tox - M. Reddy, E. Balow
Wet Chemistry - K. Vo, B. Sabharwal

3.4 **Organic Analysis Group:**

Supervisor - V. Antaki

GC/MS Operators - V. Antaki, L. McGee, M. Bassett, L. Wu

GC Operators - M. Cooper, V. Lee, S. Frondorf, M. Bassett

HPLC Operators - K. Vo, L. McGee

Extraction - H. Esteve, H. Willis

Petroleum - B. Sabharwal, M. Townsend

3.5 **Sample Custody:**

The custodians, R. Boris and D. DeTellem receive, inspect and check-in the sample. They immediately notify the lab manager, of any leak, breakage or non-matching information between the sample label and the chain-of-custody. They determine the temperature, pH, and percent solids of the received samples. They are responsible for the proper storage of the sample, the tracking of the sample through an internal chain-of-custody, and the disposal of the spent samples.

3.6 **Systems Management:**

Kelly Trilk is the Systems Manager. He is in charge of all computer operations. He designs and develops DBASE III program, and he maintains databases and installs new software. He has installed the CLP software obtained from Ward Scientific, and is working on a NETWORK system for all the analytical lab information: check-in, extraction, sample results, QC, invoice, timesheet, etc...

Jonathan Ho and Jennifer Ward work with K. Trilk and prepare the deliverable diskette.

4.0 **QA OBJECTIVES FOR MEASUREMENT DATA**

All measurements are made so that results are representative of the media (i.e. surface water, groundwater, soil/sediment, solid waste, air sample, drinking water, etc.) and calculated and reported in units consistent with other organizations reporting similar data.

4.1 **For Hazardous Waste Samples:**

The accuracy and precision control limits for each parameter are based on the EPA CLP requirements (Contract Laboratory Program) and SW-846 method, using replicates, spiked samples, calibration verifications, QC samples, etc.; and the requirements of the specific project.

4.2 **For Drinking Water Samples
and Waste Water Samples:**

The criteria expressed in the 40 CFR are intrinsically followed. In addition, each state may have some specific requirements which are followed at ECC when working for that specific state.

4.3 **For Industrial Hygiene Samples:**

For industrial hygiene, the quality assurance and quality control is implemented according to the NIOSH and OSHA methods.

Generalized goals are presented here for measurement parameters precision, accuracy, representativeness, and completeness (PARC).

Precision examines the distribution of the reported values about their mean. It is correctly determined from duplicate spiked samples (MS, MSD), duplicate spiked blanks (BS, BSD), etc. It is expressed in terms of Relative Percent Difference (RPD), defined as $(\text{difference/average}) \times 100$. In essence, precision is the degree to which the measurement is reproducible.

Accuracy assesses the bias in a measurement system, due to errors in sampling process, preservation, handling, sample preparation or sample analysis, field contamination, or due to sample matrix effects. Analytical accuracy is assessed through the use of known and unknown QC samples and spiked samples. It is expressed in terms of Percent Recovery (PR), defined as $(\text{recovered value/true value}) \times 100$. Accuracy essentially determines how close a measurement is to the true value, and thus requires knowledge of the true value of the analyte being measured.

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristic of a population of samples. It is assessed using duplicate field and laboratory splits.

Completeness is expressed as the percentage of measurements made which are judged as to be valid for the project, and is reported as Percent Completeness (PC).

5.0 **SAMPLING PROCEDURE**

Not Applicable. Samples will be received by the lab. No sampling is expected to be done by ECC personnel.

6.0 **SAMPLE CUSTODY**

6.1 **Sample Inspection:**

Samples are received by the custodians. Before signing the receipt and the chain-of-custody accompanying the samples, the custodian checks the following:

- The cooler temperature is at $4^{\circ}\text{C} \pm 2^{\circ}$.
- The seal is intact.
- The samples are in the proper containers.
- The sample containers have no leaks.
- The proper preservatives have been added to the samples. The pH is measured and recorded.

In case of problems, the custodian immediately notifies the Project Manager for field operations by telephone.

Any discrepancies between the information on the sample label, seal, and/or information that is on the chain-of-custody and the sample analysis request must be resolved before the sample is assigned for analysis.

The custodian will send back the signed chain-of-custody to the customer in the final report.

6.2 **Log-In:**

Upon arrival at the laboratory, the samples are checked in. The following information for each sample received by the lab are logged in the computer:

Customer information: name, address, contact person and phone number, work order and site, sample identification and analysis requested.

ECC information: customer number (assigned by ECC), ECC sample number, sample matrix, etc....(see attached internal chain-of-custody - ICOC)

6.3 **Chain-of-Custody:**

As soon as the samples are received and checked in, they are stored in the cold room (4°C) by the laboratory custodian. The volatile samples are stored in the refrigerator assigned to volatile samples. A sample known to contain a high concentration is put in a ziplock plastic bag and stored separately to avoid cross-contamination. A copy of the internal chain-of-custody is delivered to the Laboratory Director.

The Laboratory Manager assigns the various tasks to the chemists on the ICOC. Copies of the ICOC are distributed to the chemists as assignments, to the director, and to the administrative manager.

The original ICOC is signed by the lab manager and stays in a bind book (one binder for contract customers and another binder for industrial customers). The chemists will sign out/in the ICOC when obtaining the samples from the custodian and returning them for refrigeration and storage.

When the sample analyses are finished, the original ICOC is removed and turned in with the samples report to the administrative manager.

Characterization of the sample as hazardous or non-hazardous is also noted on the ICOC. A copy of the original ICOC with all signatures is put in the report file. The original one is logged in a binder and kept as an official document.

6.4 **Sample Holding:**

Holding times depend upon the EPA specifications for various analyses and matrices. At ECC, all samples are stored at 4°C in the sample cold room and are kept completely separated from the standards (which are stored in the standards refrigerator). The temperature is checked twice a day by the custodian and logged on a logsheet affixed on the refrigerator door.

In general all sample preparations are started immediately upon receipt and check-in of the samples. Air sample holding times are in compliance with the applicable analytical method.

7.0 CALIBRATION PROCEDURES

7.1 Chemical Calibration Curves:

Before the samples are analyzed on the analytical instrument, chemical calibration standards of each target analyte must be analyzed to establish that the instrument is functioning properly with the desired sensitivity.

The calibration standards are injected in the instrument under the same conditions as the samples. The concentrations of the chemical calibration standards are chosen to bracket the optimum range of the method.

The instruments tuning and optimization are performed daily by the main operator and logged in.

7.2 Calibration Procedures:

7.2.1 Metals Analysis by ICP,

Graphite Furnace, or Cold Vapor:

Calibration standards are analyzed each day. Permanent record of all standards used, including date of preparation, source and lot number of material are kept in the laboratory.

A minimum of five concentration standards are used to calibrate the graphite furnace and ICP. Calibration verification standards (ICV and CCV) and calibration verification blanks (ICB and CCB) are analyzed at the beginning, every ten samples, and at the end of the analysis to verify the calibration.

For ICP, the control limit is $\pm 10\%$.

For graphite furnace, the control limit is $\pm 10\%$ (CLP) or $\pm 15\%$ (SW-846).

For ICP, an interference check sample is run at the beginning and end of each sample analysis run. Its control limits is $\pm 20\%$.

For Graphite Furnace, analytical spikes are run for every new matrix. The control limit is $\pm 15\%$.

Mercury is analyzed by the cold vapor technique. A set of 5 levels of standards is used to calibrate the instrument. The calibration checks are done at the beginning, every ten samples, and at the end of the run with a control limit of $\pm 20\%$.

7.2.2 Organic Compounds by GC/MS:

Tuning:

The GC/MS is autotuned or manually tuned. In order to verify the tuning before semivolatile analysis, a solution of decafluorotriphenylphosphine (DFTPP) in methylene chloride is injected every 12 hours (for drinking water every 8 hours). The chromatogram and spectrum of DFTPP are examined. They should pass the requirements set in Table 3 of EPA Method 8270.

A solution of 4-Bromofluorobenzene (BFB) in methanol is used every 12 hours (for drinking water every 8 hours) to verify the tuning of a GC/MS used for volatile analysis. The spectrum of BFB should pass the requirements set in Table 3 EPA Method 8240.

If the tuning check does not pass, an autotune is run to determine that the GC/MS is functioning properly. The GC/MS can be manually tuned. The manual tune file containing all the setting and conditions of analysis is saved. Both the calibration curve and the sample analysis are done using the same manual file.

Calibration:

The GC/MS is standardized by running a calibration curve prepared at 5 levels of mixed standards of the compounds listed in EPA Method 8270 (or Method 625 or 525). For volatile analysis the GC/MS is standardized by running a calibration curve prepared at 5 levels of mixed standards of the compounds listed in EPA Method 8240 (or Method 8260, 624, or 524). A relative standard deviation of less than 35% is required for the response factors (RF) of the 5 levels of each compound.

A calibration check sample is injected every 2 hours to verify that the calibration has not changed from day-to-day. The calibration curve is then updated and the analysis can begin.

Internal standards are added immediately before analysis. The various compounds are quantitated with respect to the internal standard close enough in retention time to the quantitated compound. Surrogates are spiked on all samples just before extraction to determine the accuracy of the sample preparation.

7.2.3 Gas Chromatography:

A calibration curve is prepared at 5 level concentration. The percent RSD of the 5 levels is within 20%. A performance evaluation mix to check the breakdown of pesticides and a resolution check standard are analyzed at the beginning of the day. A calibration check standard and a calibration blank are analyzed at the beginning, every 10 samples, and at the end of the analytical run. The calibration check has to pass within $\pm 15\%$. If it does not pass, a new calibration curve is run.

PCB Analysis:

Single point standards are run followed by the samples for screening and identification. If PCB's are present, a five point curve for the identified PCB is analyzed at concentrations bracketing the sample.

Petroleum Analysis (Modified 8015):

The standardization is done using commercial diesel fuel for extractable TPH analysis and commercial gasoline for volatile TPH analysis. A horizontal baseline is drawn before quantitation. The whole area underneath the pattern of peaks is integrated for calculation.

Volatile (By Methods 8010, 8020, and 8021):

A standard obtained from Supelco is used for calibration. The five levels standardization is done using purge and trap extraction.

HPLC Analysis:

A calibration curve is prepared daily at a minimum of five standard levels. A blank and a calibration check standard (quality control sample) are used to verify the calibration curve before analysis. The explosives (8330) and PAHs (8130) are analyzed by HPLC.

Ion Chromatography:

A calibration curve is prepared daily at five levels. A blank and a calibration check are used to verify the standardization.

Fluoride, chloride, sulfide, sulfate, phosphate, nitrate, and nitrite are analyzed by ion chromatography.

7.2.4 Wet Chemistry (Cyanide, Sulfide, Sulfate, Chloride, Phosphorous, Nitrate/Nitrite) by Technicon Autoanalyzer, Turbidity, UV, or Titration:

For the automated analysis, standard curve is prepared using a blank and six standards. The calibration curve is verified by analyzing a blank and QC standard before analysis and at a frequency of 5%. For manual analysis, a blank and five standards are used.

7.3 Reference Material:

Quality Control samples used to verify the calibration curve are obtained from EPA, NIOSH, NBS, etc. Some are prepared in-house from known reliable sources.

All standard preparations are recorded in the standard preparation logbook. The stock, origin, lot number, dilutions, weigh, solvent, and analysts initials are recorded.

8.0 CURRENT ANALYTICAL METHODOLOGY

The following analyses and tests are done at ECC and the methods used are obtained from the following references:

8.1 Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (40CFR136, Appendix A, 1991):

600s Methods

8.2 Methods for Chemical Analysis of Water and Wastes, EPA Manual 600/4-79-020, USEPA (1983) for the following analysis:

- Metals (individual metal by flame or furnace or cold vapor and ICP). (200s)
- Physical properties: color, conductance, hazardous odor, pH, all residue test, temperature, and turbidity. (100s)

- Inorganics, non-metals, acidity, alkalinity, bromide, fluoride, chloride, cyanide, iodide, carbon dioxide, chlorine, nitrogen, nitrate, nitrite, phosphorous, silica, sulfate, sulfide... (300s)
 - Organics, general screening: BOD, COD, oil and grease, total organic carbon, petroleum hydrocarbons, phenolics, surfactants, NTA. (400s)
- 8.3 **Standard Methods for the Examination of Water and Wastewater**, 16th edition (1985) for the following analysis:
- Total Cyanide (A412D).
- 8.4 **Methods for the Determination of Organic Compounds in Finished Drinking Water and Source Water**. Environmental Monitoring and Support Laboratory, USEPA (September, 1986 - 500 Series Method):
- 500s Methods
- 8.5 **Test Methods for Evaluating Solid Waste**, SW-846, 3rd Ed. USEPA (1986).
- Metals analysis (7000s).
 - Sample preparation for metals (3000s)
 - Organic analysis (8000s).
 - Sample preparation for organics (3000s).
 - Sample clean-up (3000s).
 - Metals analysis by ICP (6010).
 - Inorganic and general tests (9000s).
 - RCRA hazardous waste characterizations (1000s) (TCLP, EP Toxicity, corrosivity, ignitability, reactivity).
- 8.6 **EPA - 600/4-82-020**.
- PCB in transformer oil.
 - Waste solvent identification.

8.7 **NIOSH Manual of Analytical Methods, 2nd Ed.**

- NIOSH Manual of Analytical Methods, 3rd Ed.
- NIOSH (February 15, 1985, Revised May 1985).
- Air sample analysis for metals, gas, pesticides, alcohols, and various organic.

8.8 **OSHA Analytical Methods, 2nd Ed. (January 1990)**

8.9 Attached is a list of the current SOPs.

9.0 **DATA REDUCTION, VALIDATION, AND REPORTING**

9.1 **Data Reduction:**

9.1.1 **Units:**

Results are obtained in ug/L concentration from the HPLC, graphite furnace, cold vapor, GC, and GC/MS volatile, and in mg/L concentration from the ICP, the GC/MS for BNA, IR, and wet chemistry.

9.1.2 **Software:**

All sample preparations data: weight, volume, and dilution are first entered in the computer by the technicians. All analyte values in mg/L or ug/L (instrument readout) are entered by the chemists. The analyte concentration in the sample is calculated by the software (FoxPro and LabMan).

For metal analysis only, the data are directly collected from the instrument on a diskette and read and calculated by a CLP software (Ward Scientific).

9.1.3 **Detection Limit:**

For Metals and Cyanide, the instrument detection limit (IDL) is determined according to the EPA Contract Laboratory Program (CLP) i.e. a standard solution in deionized water of all the mixed analytes, at a concentration of 3 to 5 times the estimated DL, is analyzed seven times on 3 non-consecutive days. The IDL is equal to the average standard deviation of all the 21 runs multiplied by 3.

For Organics, the IDL is determined by analyzing 7 times a standard mixture in deionized water of all analytes under the specific method. The IDL is equal to 3 times the standard deviation of the 7 analyses.

The MDL in water is determined by preparing 3 solutions in ground water. Each solution contains all the analytes under the specific method at 5 times the IDL. The 3 ground water solutions are extracted and analyzed according to the specific method. The MDL is equal to 7 times the standard deviation of the 3 analyses.

The MDL in soil is determined by extracting and analyzing 3 soil blanks spiked at 5 times the IDL. The MDL is equal to 7 times the standard deviations of the 3 analyses.

The number of analyses performed to determine the MDL can vary. The factor used to multiply the standard deviation will depend on the number of analyses done according to SW-846.

9.1.4 Internal Standards:

Internal standards are used in all GC/MS analysis.

9.1.5 Percent Solid:

All soil samples are reported on a "dry weight" base for metals, VOA, BNA and Pest/PCB. A percent solid is calculated and used to correct the result of analysis.

9.1.6 Desorption Efficiency:

A desorption efficiency is determined for organic analysis done on charcoal tube (industrial hygiene sample).

9.2 Validation:

Validation of the samples results is done by the QA/QC officers who carefully compare the tuning, calibration, calibration check, and QC data to establish QC limits; verify the computation; check the adherence to SOPs; and unusual cases are commented on in a narrative.

9.2.1

Validation of the metal data is done by the examination and assessment of the standardization data, the calibration check data, the blank data, the interference check sample (for ICP only), the analytical spike (for AAS), and the QC results.

9.2.2

For GC, peak identification is based upon retention time and sample spike. Validation of the positive results is done by using a second column for data confirmation.

9.2.3

Validation of GC/MS results is done by careful examination of the retention time of the compound and of the spectrum of each ion and comparison with reference spectra.

A library search is done to identify any detected peak. The Hewlett Packard GC/MS Aquarius software automatically compares the spectrum of the detected ions to the standards spectra saved in the computer memory. The GC/MS NBS/NIH/EPA/MSDC BASE-1 and PBM Library contains 52,000 compounds and allow the tentative identification of any peak that exceeds the tenth (1:10) of the nearest internal standard.

9.2.4 When data are out of the standard curve, the sample extract is diluted down to the standard curve range.

9.2.5 Surrogates are spiked on all organic samples to determine the accuracy of the extraction. The control limit of the surrogate recovery are determined by the method used.

9.2.6 Blank, duplicate analysis, QC, and spiked samples are evaluated and reported along with the samples.

For metals, the blank results should be below the MDL. If the blank results are higher than the MDL, the blank is considered contaminated and a corrective action should immediately be taken.

The duplicate should have a % RPD $((\text{difference/average}) \times 100)$ of less than 20% for metals (or according to EPA method for organics).

The spiked sample and QC indicate the accuracy of the analytical method. A % recovery is calculated as follows: $((\text{recovered/true value}) \times 100)$.

The limits of acceptance are set in the EPA methods. For metals, it is usually 25%. For organic, a control range is given for each compound. If the percent recovery is out of range due to matrix interference, the result is flagged.

The samples and QC raw data and all the calculations are checked by the supervisor or the lab manager and reviewed by the QC officer. Technical review check lists are used by the chemist, the supervisor, and the QA officer when reviewing the data.

9.3 Report:

A faxed or oral report can be obtained within 24 hours upon request. Written reports follow within the agreed upon turn around time.

The metals are reported as CLP deliverable (i.e., using the EPA format for CLP, whenever requested), with all the CLP Quality Control forms (blank, spike, duplicate, calibration check, interference check...). A narrative discussion accompanies the CLP package.

For Inorganics the data report shows the following: Sample source, field sample number, ECC number, type of matrix, type of analysis method of analysis, date of extraction, and analysis, logbook number and page, and finally data results in appropriate units.

Organics are reported on ECC forms that includes the matrix spike and the matrix spike duplicate form. The tuning data, the calibration check, and the calibration curve can also be reported on CLP forms upon request or supplied as raw data copies. The surrogate percent recovery and the computer search results are part of our usual report.

Unknown compounds are reported by their functional group and the empirical formula, example: fatty acid ($C_{10}H_{20}O$).

Some "flags" are used in our reports. They are taken from the CLP.

The quality assurance officers review all final reports and evaluates the performance of the laboratory for each type of work or contract. All reports are signed by the QA/QC Manager and/or by the Project Director.

All analytical data are archived for five years. ECC guarantees the safeguarding of the analytical data obtained in our laboratories.

All report, data package, and documentation related to customer samples are kept under strict CONFIDENTIALITY.

10.0 INTERNAL QUALITY CONTROL CHECKS

In addition to the requirements discussed thus far, Quality Assurance (QA) samples must be analyzed to provide quantitative evidence that the entire method is performed as demonstrated during certification. It is essential that controls are initiated during and maintained throughout the analysis of samples. Data generated from the control samples are plotted on control charts, which are used to monitor day-to-day variations in routine analyses.

10.1 Sample Batch:

A batch contains up to 20 samples of the same matrix.

A preparation batch is the series of samples (up to 20) extracted or prepared together simultaneously or in continuous sequential time periods using the same reagents, glassware, by the same people. In addition to the analytical samples, the batch includes the method blank, the duplicate sample, the spike and spike duplicate, and LCS. (The spike can be a matrix spike or, in case there is not enough sample, a blank spike.)

The analytical or instrument batch consists of the samples run together on an instrument within a period of time. An analytical batch contains the appropriate number and type of calibration solutions, quality control samples and regular analytical samples analyzed over a period of time.

10.2 Laboratory Quality Control:

10.2.1 For Lack of Contamination:

Method Blanks - Water blanks are used when water samples are analyzed and soil blanks are used when soil samples are analyzed. Blank filter or sorbent tube are used as blank for air samples. Method blanks are run with every batch analyzed. They demonstrate the lack of contamination of glassware and reagents used in the lab. Analytical data are not corrected for the presence of analytes in the blanks.

10.2.2 For Precision:

Duplicate Samples - Which demonstrate the precision of the analytical methods. At least one sample, per matrix, is analyzed in duplicate for every batch of samples.

10.2.3 For Accuracy:

Spike Samples - A matrix spike and matrix spike duplicate are prepared for every batch. The percent recovery should be within 25% of the true value for metals. For organic, the percent recovery should be within the QC range established (by the lab or the method). Matrix effects can greatly change the percent recovery of a spike.

In graphite furnace analysis post-digestion spikes or standard additions are also used to check the matrix effect.

Surrogates - In GC/MS or GC analysis surrogates are spiked before extraction (three for Volatile, six for Semivolatile and one for Pesticide/PCB) to monitor the extraction and concentration procedures. Surrogate spike recoveries should be within the control limits set by EPA.

10.2.4 For Method Verification:

QA Samples - Are obtained from EPA or from a known source. They are used as calibration verification standards (ICV) for metals. When digested or extracted, the laboratory control samples (LCS) establish the accuracy of the analytical methods. The percent recovery should be within the working acceptable range supplied with the samples or established in-house.

QC sample results are used to build QC charts. These are kept in file and every new QC results is compared to the chart. These charts help determine the presence of out-of-calibration standards and outliers.

10.3 Quality Control Report:

10.3.1 A quality control report for metal analysis consists of the following CLP forms:

1. Header form
2. Sample analysis (Form 1)
3. Calibration Verification (Form 2)
4. Blank (Form 3)
5. Interference Checks (Form 4)
6. Matrix Spike (Form 5)
7. Duplicate (Form 6)
8. Laboratory Control Sample (LCS - Form 7)

ENVIRONMENTAL CHEMICAL CORPORATION CODE EXPLANATION FOR METAL ANALYSIS

"Work Order" Is the Customers Project No.

"Project" Is the ECC Project No.

UNDER COLUMN C:

"U" Element not detected, below **detection** limit.

"B" Element concentration just **greater** than instrument detection limit (IDL), but lower than the Contract Required **Detection** Limit (CRDL).

UNDER COLUMN Q:

"N" Spiked sample recovery out of control limit.

* Duplicate analysis out of control limit.

UNDER COLUMN M:

"P" ICP analysis.

"F" Furnace AA analysis.

"CV" Manual Cold Vapor AA analysis.

"NR" Not Required

FOR ORGANIC ANALYSIS:

"J" Indicates trace amount **showing**.

"*" Lab Contamination.

"B" A value was found in the method blank for that compound.

These forms are supplied with each work order. If the work order has more than 10 samples, QC items 6, 7 and 8 are done with that work order. If the work order has less than 10 samples, QC items 6, 7 and 8 are obtained from the QC samples analyzed that day on a different job and reported under "batch specific QC report".

10.3.2 A quality control report for GC/MS analysis consists of the following:

1. Tuning check data for each day of analysis
2. Calibration check data for each day of analysis
3. Method blank for each day of sample preparations
4. Sample result forms with surrogate recovery and TIC form
5. MS/MSD forms
6. Blank spike
7. Duplicate analysis

These forms are supplied with each work order. If the work order has more than 10 samples, QC items 5, 6 and 7 are done with that work order. If the work order has less than 10 samples, QC items 5, 6 and 7 are obtained from the QC samples analyzed that day on a different job and reported under "batch specific QC report".

10.3.3 A quality control report for GC or HPLC analysis consists of the following:

- Method blank for each day of sample preparation
- Sample results form with surrogate recoveries
- MS/MSD form
- LCS or blank spike
- Duplicate

10.3.4 A quality control report form for wet chemistry consists of the following:

- Method blank
- Sample results
- Duplicate results
- QC sample analysis

10.4 Control Charts:

Control charts are used to monitor the variations in the precision and accuracy of routine analyses and detect trends in these variations. The construction of a control chart requires initial data to establish the mean and range of measurements. The QC control charts are constructed from data representing performance of the complete analytical method.

Data from check standards or from QC samples within a lot are compared to control chart limits to demonstrate that analyses of the lot are under control, and are used to update the charts.

11.0 PERFORMANCE AUDIT

11.1 Inspections:

An Audit or Inspection Form is designed for each project. The laboratory is audited for:

- general facility criteria: space, ventilation, temperature, organization;
- for instrumental parameters: calibration, calibration verification, QC;
- for personnel training and performance;
- for record keeping: notebooks, maintenance books, standard prep books;
- and for SOP adherence.

Each unsatisfactory rating must be explained in full, following consultation with the appropriate technician, scientist, or Laboratory Manager. The Inspection Form and any explanations contained in an appended inspection report, must be signed and dated by each QAU member participating in the Inspection. A copy of the Inspection Form and any appended inspection report is given to the Laboratory Manager and Director at the completion of the Inspection. The originals are kept with other Quality Assurance records.

The Quality Assurance Unit (QAU) inspects critical phases of each project conducted at ECC and maintains written, signed, and dated records of each inspection.

**11.2 Inter-Laboratory Performance
Evaluation Studies:**

ECC is accredited by the American Industrial Hygiene Association and participates regularly in the AIHA Round Robin (PAT Program established by NIOSH) for the analysis of metals and solvents (Accreditation Number 364). Accreditation renewed in 1991.

The Cincinnati laboratory is validated by the Corps of Engineers and has successfully passed their pre-award testing samples and survey inspections in 1987, in 1989, in 1991, and in 1993. The Cincinnati laboratory is currently the main QA lab for the Corps of Engineers.

The Cincinnati laboratory is certified by EPA and regularly participates in the WS and WP studies for the analysis of pesticides, herbicides, metals (EP Toxicity), chlorides, fluorides, nitrate/nitrite, hardness, etc. (Certification #4100). Certification renewed in 1991 and 1994.

In addition, the Cincinnati laboratory has successfully analyzed the pre-award samples for the Contract Laboratory Program and has been awarded a CLP contract in 1992. A survey inspection of five EPA members came to inspect and approve the lab in 1988, in 1992, and in 1993. The CLP PE samples are analyzed every year.

The ECC lab has also been audited by various engineering companies prior to contract awards: OHM, Montgomery Watson, Rust, Law Engineering, Kaiser, etc...

12.0 PREVENTIVE MAINTENANCE A maintenance book is kept for each instrument showing:

Description, manufacturer, model number, serial number, date of last problem or maintenance, repair, minor change, or service.

Preventive Maintenance:

ICP	The torch and nebulizer are cleaned every month or after a particularly dirty analytical run. 2% HNO ₃ acid is flushed between sample analysis and at the end of the analytical day. Entrance tubes are changed regularly. Fans are cleaned every three months.
AAS	Tubes and platforms are changed every two days or after particularly dirty samples.
GC/MS	The septum and liner are changed every day. The ion source is cleaned every three months or when the autotune fails. The pump oil is changed every six months.
GC/ECD	A new septum is used every week. The column is equilibrated at the required initial temperature and flow before use. A new column is conditioned before use.
HPLC	The pump is primed at the beginning of every analytical day and flushed at the end of every analytical day. All mobile phases are filtered and degassed. The frits and seals are checked regularly.
Auto-Analyzer	All tubes are cleaned and filled with buffer at the end of the day.
Autosamplers	Syringes are checked regularly on all autosamplers.

Balances are calibrated before the preparation of a stock solution and checked once a day before the balance is used. They are checked by the manufacturer and calibrated once every six months.

Service Contracts:

In case of major instrument failure, technical engineers are called for help. ECC has service contracts with the following companies:

- With Hewlett Packard for the maintenance of four GC/MS.
- With Perkin Elmer for the Graphite Furnace.
- With Thermo Jerrell-Ash for the ICP.

13.0 ASSESSMENT OF DATA PRECISION, ACCURACY, AND COMPLETENESS

13.1 Data Precision:

A relative percent difference is calculated between two duplicates or splits.

$$\% \text{ RPD} = (\text{difference/average}) \times 100$$

For metals, 20% is the acceptable maximum percent RPD. For organic, that percentage varies according to the compound and the method.

To calculate the dispersion of data for a large number of samples, the mean is calculated, the standard deviation is determined and a range of dispersion is obtained.

13.2 Data Accuracy:

A percent recovery is calculated for spiked samples as follows:

$$\text{Percent Recovery} = (\text{spiked sample value} - \text{sample value}) / \text{spike added} \times 100$$

The percent recovery limits vary from 75 - 125% for metals.

The percent recovery of QC samples are used to build the QC Charts. If all the results fall above the average, the method is biased high; or if all the results fall below the average, the method is biased low.

13.3 Completeness:

If all QC are passing in a project, then a 100% completeness is achieved. For each project (or Site) ECC lab will try to achieve the highest degree of completeness.

14.0 **CORRECTIVE ACTION**

Any problems or potential system problems are detected through the calibration check samples, the QC samples, the daily performance audits, and the QA audits performed by the QA Director. These problems and possible solutions are immediately discussed with the group leader.

14.1 **Out-of-Control Situations:**

Failure to meet calibration criteria, recordkeeping omissions, improper sampling technique, and improper storage or preservation of samples are all conditions that affect data quality and require investigation/correction. Immediate action is taken to find the problem, correct it, recalibrate, and reanalyze the samples.

An out-of-control situation for control charts may be indicated by a value outside the control limits or classified as outlier by statistical tests. --

14.2 **Corrective Action:**

Whenever an out-of-control situation is detected, the analyst and Laboratory Manager must investigate to determine the cause and document actions taken. Data acquired concurrently with this condition shall be discarded and samples reanalyzed unless the investigation of the problem proves that the analysis was in control.

Corrective actions associated with the project are documented and records are maintained in the laboratory.

After the corrective actions have been instituted, the systems performance should be rigorously checked before continuing on with sample analysis.

No analysis should be started if the calibration check samples are falling out of the EPA limits. The problem should be diagnosed, the system fixed, and the calibration restarted and rechecked before any analysis can be started.

**15.0 QUALITY ASSURANCE
REPORTS TO
MANAGEMENT**

The QAU officers:

1. Periodically inspect every phase of each laboratory project and maintain properly signed and dated records of each inspection.
2. Immediately provide the Director and Laboratory Management with a written report of any problems of deficiencies found during inspections.
3. Assure that no deviations from approved Standard Operating Procedures are made without prior written authorization.
4. Review the final report of each project conducted at ECC to assure that the report accurately describes the experimental methods, raw data observations, results, and standard operating procedures pertaining to the project.
5. Maintain an Archives which is the legally required repository of all documents pertaining to studies.

ATTACHMENTS:

**ECC CHAIN-OF-CUSTODY
LIST OF CURRENT SOPS
EXAMPLE OF METALS REPORT
EXAMPLE OF VOLATILE REPORT**

Date Printed: 04/19/94

Customer: [REDACTED]

Customer No.: [REDACTED]

Contact: [REDACTED]

Source: [REDACTED]

Work Order #: [REDACTED]

Doc

4/26/94

u

Phone: [REDACTED]

P.O. Number:

Approx. Billing Date: 05/01/94

Refrigerated: Y / N

Date: 4/19/94

Time: 10:00 am / pm

Init: [REDACTED]

Lab #: 18900-001

Matrix: SOIL/Soil

Hazardous: Y / N

Sample No. 940415-H048

Sampled: 04/14/94

Containers: 2

Location: AOC12MRD

Analysis: Volatiles Hold Date-04/27/94

Lisa/Lanying

Lab #: 18900-002

Matrix: SOIL/Soil

Hazardous: Y / N

Sample No. 940415-H051

Sampled: 04/14/94

Containers: 2

Location: AOC13MRD

Volatiles Hold Date-04/27/94

Lab #: 18900-003

Matrix: SOIL/Soil

Hazardous: Y / N

Sample No. 940418-H010

Sampled: 04/16/94

Containers: 2

Location: AOC21MRD

Volatiles Hold Date-04/29/94

Lab #: 18900-004

Matrix: SOIL/Soil

Hazardous: Y / N

Sample No. 940418-H013

Sampled: 04/16/94

Containers: 2

Location: AOC22MRD

Volatiles Hold Date-04/29/94

Lab #: 18900-005

Matrix: SOIL/Soil

Hazardous: Y / N

Sample No. 940418-H016

Sampled: 04/15/94

Containers: 2

Location: AOC28 MRD

Volatiles Hold Date-04/28/94

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COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

30W No.: ILM02

[illegible]

(TOTAL METALS)

Title: GA/GC mmmATGca

ENVIRONMENTAL CHEMICAL CORPORATION

METAL SUMMARY REPORT

Customer: _____
 Location: _____
 Cust. Proj. No.: 5120

Project No.: 18800
 Date Received: 03/31/94

LAB I.D.	CUSTOMER SAMPLE NO.	ANALYSIS	DATE DIGESTED	PREP BATCH	DATE ANALYZED	INSTRUMENT BATCH
CP						
18800-008	RW-1	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-009	RW-2	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-010	RW-3	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-011	RW-4A	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-012	RW-4B	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-013	RW-4C	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-014	FIELD BLANK	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-016	SW-1	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-017	SW-2	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-018	SW-3	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-019	RB	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
BLANK	N/A	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
18800-010 DUP	RW-3	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
00-010 MS	RW-3	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
US	N/A	METAL	04/04/94	DIGW0404	04/04/94	ICP0404
GRAPHITE FURNACE						
18800-008	RW-1	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-008	RW-1	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-008	RW-1	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-008	RW-1	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-008	RW-1	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
18800-009	RW-2	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-009	RW-2	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-009	RW-2	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-009	RW-2	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-009	RW-2	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
18800-010	RW-3	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-010	RW-3	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-010	RW-3	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-010	RW-3	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-010	RW-3	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
18800-011	RW-4A	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-011	RW-4A	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-011	RW-4A	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
00-011	RW-4A	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-011	RW-4A	Thallium	04/04/94	DIGW0404	04/12/94	AA0412
18800-012	RW-4B	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-012	RW-4B	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-012	RW-4B	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-012	RW-4B	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1

ENVIRONMENTAL CHEMICAL CORPORATION

METAL SUMMARY REPORT

Customer: _____ Project No.: 18800
 Location: _____ Date Received: 03/31/94
 Cust. Proj. No.: 5120

LAB I.D.	CUSTOMER SAMPLE NO.	ANALYSIS	DATE DIGESTED	PREP BATCH	DATE ANALYZED	INSTRUMENT BATCH
GRAPHITE FURNACE						
18800-012	RW-4B	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
18800-013	RW-4C	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-013	RW-4C	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-013	RW-4C	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-013	RW-4C	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-013	RW-4C	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
18800-014	FIELD BLANK	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-014	FIELD BLANK	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-014	FIELD BLANK	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-014	FIELD BLANK	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-014	FIELD BLANK	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
18800-016	SW-1	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-016	SW-1	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-016	SW-1	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-016	SW-1	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-016	SW-1	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
18800-017	SW-2	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-017	SW-2	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-017	SW-2	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-017	SW-2	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-017	SW-2	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
18800-018	SW-3	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-018	SW-3	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-018	SW-3	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-018	SW-3	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-018	SW-3	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
18800-019	RB	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-019	RB	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-019	RB	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-019	RB	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-019	RB	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
BLANK	N/A	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
BLANK	N/A	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
BLANK	N/A	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-010 DUP	RW-3	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-010 DUP	RW-3	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-010 DUP	RW-3	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-010 DUP	RW-3	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-010 DUP	RW-3	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
BLANK	N/A	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
BLANK	N/A	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1

ENVIRONMENTAL CHEMICAL CORPORATION

METAL SUMMARY REPORT

mer. _____
 Location: _____
 Cust. Proj. No.: 5170

Project No.: 0
 Date Received: 03/31/94

LAB I.D.	CUSTOMER SAMPLE NO.	ANALYSIS	DATE DIGESTED	PREP BATCH	DATE ANALYZED	INSTRUMENT BATCH
GRAPHITE FURNACE						
LCS	N/A	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
LCS	N/A	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
LCS	N/A	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
LCS	N/A	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
LCS	N/A	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1
18800-010 MS	RW-3	Arsenic	04/04/94	DIGW0404	04/07/94	AA0407-1
18800-010 MS	RW-3	Lead	04/04/94	DIGW0404	04/06/94	AA0406-1
18800-010 MS	RW-3	Selenium	04/04/94	DIGW0404	04/05/94	AA0405-1
18800-010 MS	RW-3	Antimony	04/04/94	DIGW0404	04/08/94	AA0408-1
18800-010 MS	RW-3	Thallium	04/04/94	DIGW0404	04/12/94	AA0412-1

MERCURY

18800-008	RW-1	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-009	RW-2	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-010	RW-3	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-011	RW-4A	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-012	RW-4B	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-013	RW-4C	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-014	FIELD BLANK	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-016	SW-1	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-017	SW-2	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-018	SW-3	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-019	RB	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
BLANK	N/A	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-010 DUP	RW-3	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
18800-010 MS	RW-3	Mercury	04/04/94	HGW0404	04/04/94	HGW0404
LCS	N/A	Mercury	04/04/94	HGW0404	04/04/94	HGW0404

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RW-1

Lab Name: ENVIR._CHEMICAL_CORP._ Contract: _

Work_Order: 5120_ Project: 18800_

Matrix (soil/water): WATER

Lab Sample ID: 008_

Level (low/med): LOW_

Date Received: 03/31/94

% Solids: _0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8.0	U		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	21.6			P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	31300			P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	59.0			P
7439-89-6	Iron	1660			P
7439-92-1	Lead	2.4	B		F
7439-95-4	Magnesium	22500			P
7439-96-5	Manganese	11.4	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	514	B		P
7782-49-2	Selenium	20.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	7510			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	11.2	B		P
7440-66-6	Zinc	23.8			P
	Cyanide	10.0	U		CN

Color Before: _

Clarity Before: _

Texture: _

Color After: _

Clarity After: _

Artifacts: _

Comments:

RW-1 JONES WELL TOTAL METALS

POST_DIGEST_SPIKE_RECOVERIES: AS = 109%, PB = 108%, SE = 93%, SB = 97%

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RW-1

Lab Name: ENVIR. CHEMICAL CORP. Contract: _

Work Order: 5120 Project: 18800

Matrix (soil/water): WATER

Lab Sample ID: 008

Level (low/med): LOW

Date Received: 03/31/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8.0	U		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	21.6			P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	31300			P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	59.0			P
7439-89-6	Iron	1660			P
7439-92-1	Lead	2.4	B		F
7439-95-4	Magnesium	22500			P
7439-96-5	Manganese	11.4	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	514	B		P
7782-49-2	Selenium	20.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	7510			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	11.2	B		P
7440-66-6	Zinc	23.8			P
	Cyanide	10.0	U		CN

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

RW-1 JONES WELL TOTAL METALS

POST DIGEST SPIKE RECOVERIES: AS = 109%, PB = 108%, SE = 93%, SB = 97%

ENVIRONMENTAL CHEMICAL CORPORATION

1

EPA SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

RW-2

Lab Name: ENVIR. CHEMICAL CORP. Contract:

Work Order: 5120 Project: 18800

Matrix (soil/water): WATER

Lab Sample ID: 009

Level (low/med): LOW

Date Received: 03/31/94

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	60.8	B		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	21.2			P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	29900			P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	73.8			P
7439-89-6	Iron	2710			P
7439-92-1	Lead	3.1	B		F
7439-95-4	Magnesium	21600			P
7439-96-5	Manganese	14.5	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	540	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	7080			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	12.4	B		P
7440-66-6	Zinc	23.7			P
	Cyanide	10.0	U		CN

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

RW-2 MILLER WELL TOTAL METALS

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RW-3

Lab Name: ENVIR. CHEMICAL CORP. Contract: _

Work Order: 5120 Project: 18800

Matrix (soil/water): WATER

Lab Sample ID: 010

Level (low/med): LOW

Date Received: 03/31/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8.0	U		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	6.6			P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	16700			P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	46.3			P
7439-89-6	Iron	102			P
7439-92-1	Lead	1.3	B		F
7439-95-4	Magnesium	13200			P
7439-96-5	Manganese	5.2	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	359	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	5640			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	3.0	U		P
7440-66-6	Zinc	12.9	B		P
	Cyanide	10.0	U		CN

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

RW-3 JOHNSON WELL TOTAL METALS

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RW-4A

Lab Name: ENVIR. CHEMICAL CORP. Contract:

Work Order: 5120 Project: 18800

Matrix (soil/water): WATER

Lab Sample ID: 011

Level (low/med): LOW

Date Received: 03/31/94

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	104	B		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	66.4			P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	39400			P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	4.0	U		P
7439-89-6	Iron	1110			P
7439-92-1	Lead	4.1	B		F
7439-95-4	Magnesium	16400			P
7439-96-5	Manganese	252			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	1000	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	6690			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	3.0	U		P
7440-66-6	Zinc	7860			P
	Cyanide	10.0	U		CN

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

RW-4A SMITH_OUTSIDE_TAP_WELL TOTAL_METALS

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RW-4B

Lab Name: ENVIR. CHEMICAL CORP. Contract:

Work Order: 5120 Project: 18800

Matrix (soil/water): WATER

Lab Sample ID: 012

Level (low/med): LOW

Date Received: 03/31/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8.0	U		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	16.0			P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	9700			P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	196			P
7439-89-6	Iron	16.5	B		P
7439-92-1	Lead	2.7	B		F
7439-95-4	Magnesium	5360			P
7439-96-5	Manganese	2.7	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	277	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	3500	B		P
7440-28-0	Thallium	2.3	B		F
7440-62-2	Vanadium	7.4	B		P
7440-66-6	Zinc	36.5			P
	Cyanide	10.0	U		CN

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

RW-4B SMITH_KITCHEN_TAP_WELL TOTAL METALS

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RW-4C

Lab Name: ENVIR. CHEMICAL CORP. _____ Contract: _____

Work Order: 5120 _____ Project: 18800 _____

Matrix (soil/water): WATER

Lab Sample ID: 013 _____

Level (low/med): LOW _____

Date Received: 03/31/94

% Solids: _____ 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L _____

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	377	-		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	17.0			P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	8860			P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	4.0	U		P
7439-89-6	Iron	506			P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	4280	B		P
7439-96-5	Manganese	7.0	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	847	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	5700			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	3.0	U		P
7440-66-6	Zinc	18.0	B		P
	Cyanide	10.0	U		CN

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

RW-4C _____ SMITH_HAND_DUG_WELL _____ TOTAL_METALS _____

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

FIELD BLANK

Lab Name: ENVIR. CHEMICAL CORP. Contract:

Work Order: 5120 Project: 18800

Matrix (soil/water): WATER

Lab Sample ID: 014

Level (low/med): LOW

Date Received: 03/31/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8.0	U		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	152	B		P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	4.0	U		P
7439-89-6	Iron	11.0	U		P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	55.0	B		P
7439-96-5	Manganese	1.0	U		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	137	U		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	299	B		P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	3.0	U		P
7440-66-6	Zinc	5.0	U		P
	Cyanide	10.0	U		CN

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FIELD BLANK TOTAL METALS

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SW-1

Lab Name: ENVIR. CHEMICAL CORP. Contract: _

Work Order: 5120 Project: 18800

Matrix (soil/water): WATER

Lab Sample ID: 016

Level (low/med): LOW

Date Received: 03/31/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	231	-		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	24.2			P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	16100			P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	4.0	U		P
7439-89-6	Iron	456			P
7439-92-1	Lead	1.1	B		F
7439-95-4	Magnesium	6200			P
7439-96-5	Manganese	10.1	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	1180	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	9360			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	3.0	U		P
7440-66-6	Zinc	17.9	B		P
	Cyanide	10.0	U		CN

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

SW-1 STREAM AT JONES TOTAL METALS

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SW-2

Lab Name: ENVIR. CHEMICAL CORP. Contract: _

Work Order: 5120 Project: 18800

Matrix (soil/water): WATER

Lab Sample ID: 017

Level (low/med): LOW

Date Received: 03/31/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	425	-		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	31.8			P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	19500			P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	7.3	B		P
7439-89-6	Iron	825			P
7439-92-1	Lead	3.0	B		F
7439-95-4	Magnesium	5470	-		P
7439-96-5	Manganese	16.9			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	1370	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	8330			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	3.0	U		P
7440-66-6	Zinc	45.4			P
	Cyanide	10.0	U		CN

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

SW-2 LEACHEATE_UPSTREAM TOTAL_METALS

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SW-3

Lab Name: ENVIR. CHEMICAL CORP. Contract:

Work Order: 5120 Project: 18800

Matrix (soil/water): WATER

Lab Sample ID: 018

Level (low/med): LOW

Date Received: 03/31/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	321	-		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	17.0			P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	16800			P
7440-47-3	Chromium	8.2	B		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	4.0	U		P
7439-89-6	Iron	565			P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	8390	-		P
7439-96-5	Manganese	33.6			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	775	B		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	11400			P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	3.0	U		P
7440-66-6	Zinc	5.0	U		P
	Cyanide	10.0	U		CN

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

SW-3 LEACHEATE DOWNSTREAM TOTAL METALS

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RB

Lab Name: ENVIR. CHEMICAL CORP. Contract:

Work Order: 5120 Project: 18800

Matrix (soil/water): WATER

Lab Sample ID: 019

Level (low/med): LOW

Date Received: 03/31/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8.0	U		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	195	B		P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	4.0	U		P
7439-89-6	Iron	11.0	U		P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	93.1	B		P
7439-96-5	Manganese	1.0	U		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	137	U		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	406	B		P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	3.0	U		P
7440-66-6	Zinc	5.0	U		P
	Cyanide	10.0	U		CN

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

RB RINSATE BLANK TOTAL METALS

ENVIRONMENTAL CHEMICAL CORPORATION

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

N/A

Lab Name: ENVIR._CHEMICAL_CORP._____ Contract: _____

Work Order: 5120___ Project: 18800___

Matrix (soil/water): WATER

Lab Sample ID: BLANK_____

Level (low/med): LOW___

Date Received: 03/31/94

% Solids: ___0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8.0	U		P
7440-36-0	Antimony	4.0	U		F
7440-38-2	Arsenic	2.0	U		F
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	3.0	U		P
7440-43-9	Cadmium	4.0	U		P
7440-70-2	Calcium	9.0	U		P
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	4.0	U		P
7439-89-6	Iron	11.0	U		P
7439-92-1	Lead	1.0	U		F
7439-95-4	Magnesium	22.0	U		P
7439-96-5	Manganese	1.0	U		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	5.0	U		P
7440-09-7	Potassium	137	U		P
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	11.0	U		P
7440-28-0	Thallium	2.0	U		F
7440-62-2	Vanadium	3.0	U		P
7440-66-6	Zinc	5.0	U		P
	Cyanide	10.0	U		CN

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments:

METHOD BLANK_____ TOTAL METALS_____

ENVIRONMENTAL CHEMICAL CORPORATION

SA
SPIKE SAMPLE RECOVERY

EPA SAMPLE NO.

RW-3M

Lab Name: ENVIR. CHEMICAL CORP. _____

Contract: _____

Work Order: 5120__ Project: 18800__

Matrix (soil/water): WATER__

Level (low/med): LOW__

% Solids for Sample: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L__

Analyte	Control Limit %R	Spiked Sample Result (SSR) C	Sample Result (SR) C	Spike Added (SA)	%R	Q	M
Aluminum	75-125	1853.8700	8.0000 U	2000.00	92.7		P
Antimony	75-125	514.0000 B	4.0000 U	500.00	102.8		F
Arsenic	75-125	533.0000	2.0000 U	500.00	106.6		F
Barium	75-125	489.7100	6.6100	500.00	96.6		P
Beryllium	75-125	470.2900	3.0000 U	500.00	94.1		P
Cadmium	75-125	481.7100	4.0000 U	500.00	96.3		P
Calcium							NR
Cromium	75-125	479.9000	5.0000 U	500.00	96.0		P
Cobalt	75-125	481.7000	3.0000 U	500.00	96.3		P
Copper	75-125	525.9200	46.2700	500.00	95.9		P
Iron	75-125	1937.0600	101.8900	2000.00	91.8		P
Lead	75-125	541.0000	1.3000 B	500.00	107.9		F
Magnesium							NR
Manganese	75-125	490.2700	5.2200 B	500.00	97.0		P
Mercury	75-125	5.0440	0.2000 U	5.00	100.9		CV
Nickel	75-125	463.4900	5.0000 U	500.00	92.7		P
Potassium							NR
Selenium	75-125	499.0000	2.0000 U	500.00	99.8		F
Silver	75-125	463.6400	3.0000 U	500.00	92.7		P
Sodium							NR
Thallium	75-125	2336.0000	2.0000 U	2000.00	116.8		F
Vanadium	75-125	488.7000	3.0000 U	500.00	97.7		P
Zinc	75-125	480.3000	12.9000 B	500.00	93.5		P
Cyanide	75-125	53.3000	10.0000 U	50.00	106.6		CN

Comments:

RW-3 JOHNSON WELL TOTAL METALS MATRIX SPIKE

ENVIRONMENTAL CHEMICAL CORPORATION

6
DUPLICATES

EPA SAMPLE NO.

RW-3D

Lab Name: ENVIR. CHEMICAL CORP. _____ Contract: _____

Work Order: 5120__ Project: 18800__

Matrix (soil/water): WATER

Level (low/med): LOW__

Solids for Sample: 0.0

% Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L__

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum		8.0000	U	8.0000	U			P
Antimony		4.0000	U	4.0000	U			F
Arsenic		2.0000	U	2.0000	U			F
Barium	5.0	6.6100		6.6800		1.1		P
Beryllium		3.0000	U	3.0000	U			P
Cadmium		4.0000	U	4.0000	U			P
Calcium	5000.0	16729.7800		16395.8900		2.0		P
Chromium		5.0000	U	5.0000	U			P
Cobalt		3.0000	U	3.0000	U			P
Copper	25.0	46.2700		46.1000		0.4		P
Iron	100.0	101.8900		98.0700	B	3.8		P
Lead		1.3000	B	1.4000	B	7.4		F
Magnesium	5000.0	13153.8100		12875.3900		2.1		P
Manganese		5.2200	B	5.1700	B	1.0		P
Mercury		0.2000	U	0.2000	U			CV
Nickel		5.0000	U	5.0000	U			P
Potassium		358.6200	B	390.6600	B	8.6		P
Selenium		2.0000	U	2.0000	U			F
Silver		3.0000	U	3.0000	U			P
Sodium	5000.0	5640.5400		5526.3800		2.0		P
Thallium		2.0000	U	2.0000	U			F
Vanadium		3.0000	U	3.0000	U			P
Zinc		12.9000	B	10.4000	B	21.5		P
Cyanide		10.0000	U	10.0000	U			CN

Comments:

RW-3 JOHNSON WELL TOTAL METALS DUPLICATE

ENVIRONMENTAL CHEMICAL CORPORATION

7

LABORATORY CONTROL SAMPLE

Lab Name: ENVIR. CHEMICAL CORP. _____

Contract: _____

Work Order: 5120__ Project: 18800__

Solid LCS Source: _____

Aqueous LCS Source: PLASMACHEM__

Analyte	Aqueous (ug/L)			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits		%R
Aluminum	5000.0	4504.62	90.1						
Antimony	500.0	509.00	101.8						
Arsenic	500.0	569.00	113.8						
Barium	500.0	453.37	90.7						
Beryllium	500.0	446.97	89.4						
Cadmium	500.0	457.00	91.4						
Calcium	5000.0	4583.13	91.7						
Chromium	500.0	458.67	91.7						
Cobalt	500.0	455.97	91.2						
Copper	500.0	455.48	91.1						
Iron	5000.0	4497.78	90.0						
Lead	500.0	530.00	106.0						
Magnesium	5000.0	4498.18	90.0						
Manganese	500.0	457.10	91.4						
Mercury	5.0	5.02	100.5						
Nickel	500.0	455.81	91.2						
Potassium	5000.0	4426.31	88.5						
Selenium	500.0	518.00	103.6						
Silver	500.0	455.52	91.1						
Sodium	5000.0	4689.37	93.8						
Thallium	5000.0	5550.00	111.0						
Vanadium	500.0	459.90	92.0						
Zinc	500.0	455.57	91.1						
Cyanide	241.0	224.00	92.9						

Comments:

LCSW TOTAL METALS _____

ENVIRONMENTAL CHEMICAL CORPORATION

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ENVIR._CHEMICAL_CORP._____

Contract: _____

Work_Order: 5120__ Project: 18800__

Initial Calibration Source: PLASCHEM/PE_

Continuing Calibration Source: SPEX_____

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum	10000.0	9976.81	99.8	10000.0	9483.00	94.8	10104.44	101.0	P
Antimony	50.0	52.80	105.6	50.0	50.40	100.8	50.30	100.6	F
Arsenic	50.0	54.30	108.6	50.0	52.40	104.8	52.40	104.8	F
Barium	1000.0	996.86	99.7	1000.0	937.02	93.7	1008.37	100.8	P
Beryllium	1000.0	998.68	99.9	1000.0	944.29	94.4	1008.56	100.9	P
Cadmium	1000.0	1008.41	100.8	1000.0	961.25	96.1	1001.80	100.2	P
Calcium	10000.0	10009.83	100.1	10000.0	9383.23	93.8	9998.21	100.0	P
Chromium	1000.0	999.12	99.9	1000.0	973.42	97.3	1002.66	100.3	P
Cobalt	1000.0	999.09	99.9	1000.0	962.08	96.2	1010.78	101.1	P
Copper	1000.0	1002.42	100.2	1000.0	970.85	97.1	1016.39	101.6	P
Iron	10000.0	9977.00	99.8	10000.0	9454.80	94.5	10069.25	100.7	P
Lead	50.0	51.50	103.0	50.0	54.30	108.6	55.20	110.4	F
Magnesium	10000.0	10024.06	100.2	10000.0	9481.13	94.8	10053.04	100.5	P
Manganese	1000.0	999.99	100.0	1000.0	941.65	94.2	1003.09	100.3	P
Mercury	5.0	5.20	104.0	5.0	5.31	106.2	5.28	105.6	CV
Nickel	1000.0	1006.78	100.7	1000.0	945.49	94.5	1007.93	100.8	P
Potassium	10000.0	10051.55	100.5	10000.0	9603.72	96.0	9957.91	99.6	P
Selenium	50.0	49.70	99.4	50.0	50.60	101.2	49.90	99.8	F
Silver	1000.0	999.02	99.9	1000.0	957.53	95.8	993.05	99.3	P
Sodium	10000.0	9990.92	99.9	10000.0	9296.37	93.0	10046.31	100.5	P
Thallium	50.0	53.20	106.4	50.0	58.50	117.0	54.70	109.4	F
Vanadium	1000.0	999.12	99.9	1000.0	961.26	96.1	1014.21	101.4	P
Zinc	1000.0	1005.66	100.6	1000.0	968.70	96.9	1002.10	100.2	P
Cyanide	241.0	223.90	92.9	40.0	38.03	95.1	46.14	115.4	CN

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115
AA (CCV) 80-120

ENVIRONMENTAL CHEMICAL CORPORATION

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ENVIR._CHEMICAL_CORP._____

Contract: _____

Work Order: 5120__ Project: 18800__

Initial Calibration Source: PLASCHEM/PE_

Continuing Calibration Source: SPEX_____

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum				10000.0	9879.72	98.8			P
Antimony				50.0	49.00	98.0	49.00	98.0	F
Arsenic				50.0	52.60	105.2	52.60	105.2	F
Barium				1000.0	981.99	98.2			P
Beryllium				1000.0	987.84	98.8			P
Bismuth				1000.0	985.58	98.6			P
Cadmium				10000.0	9896.64	99.0			P
Chromium				1000.0	997.77	99.8			P
Cobalt				1000.0	1000.46	100.0			P
Copper				1000.0	992.34	99.2			P
Iron				10000.0	9839.27	98.4			P
Lead				50.0	55.70	111.4	56.80	113.6	F
Magnesium				10000.0	9889.11	98.9			P
Manganese				1000.0	986.42	98.6			P
Mercury									NR
Nickel				1000.0	976.35	97.6			P
Potassium				10000.0	9898.62	99.0			P
Selenium				50.0	50.70	101.4	50.00	100.0	F
Silver				1000.0	999.36	99.9			P
Sodium				10000.0	9847.08	98.5			P
Thallium				50.0	55.20	110.4	57.00	114.0	F
Vanadium				1000.0	988.94	98.9			P
Zinc				1000.0	991.26	99.1			P
Cyanide				40.0	38.14	95.4			CN

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115
AA (CCV) 80-120

FORM II (PART 1) - IN

ILMO2.1

ENVIRONMENTAL CHEMICAL CORPORATION

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: ENVIR._CHEMICAL_CORP.____

Contract:

Work_Order: 5120__ Project: 18800__

Initial Calibration Source: PLASCHEM/PE_

Continuing Calibration Source: SPEX_____

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead									NR
Magnesium									NR
Manganese									NR
Mercury									NR
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium				50.0	56.00	112.0			F
Vanadium									NR
Zinc									NR
Cyanide									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115
AA (CCV) 80-120

FORM II (PART 1) - IN

ILMO2.1

ENVIRONMENTAL CHEMICAL CORPORATION

3
BLANKS

Lab Name: ENVIR. CHEMICAL CORP. _____ Contract: _____

Work Order: 5120__ Project: 18800__

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		M
		C	1	C	2	C	3	C		C	
Aluminum	8.0	U	8.0	U	8.0	U	8.0	U			P
Antimony	4.0	U	4.0	U	4.0	U	4.0	U			F
Asenic	2.0	U	2.0	U	2.0	U	2.0	U			F
Barium	1.0	U	1.0	U	1.0	U	1.0	U			P
Beryllium	3.0	U	3.0	U	3.0	U	3.0	U			P
Cadmium	4.0	U	4.0	U	4.0	U	4.0	U			P
Calcium	9.0	U	9.0	U	9.0	U	9.0	U			P
Chromium	5.0	U	5.0	U	5.0	U	5.0	U			P
Cobalt	3.0	U	3.0	U	3.0	U	3.0	U			P
Copper	4.0	U	4.0	U	4.0	U	4.0	U			P
Iron	11.0	U	11.0	U	11.0	U	11.0	U			P
Lead	1.0	U	1.0	U	1.0	U	1.0	U			F
Magnesium	22.0	U	22.0	U	22.0	U	22.0	U			P
Manganese	1.0	U	1.0	U	1.0	U	1.0	U			P
Mercury	0.2	U	0.2	U	0.2	U					CV
Nickel	5.0	U	5.0	U	5.0	U	5.0	U			P
Potassium	137.0	U	137.0	U	137.0	U	137.0	U			P
Selenium	2.0	U	2.0	U	2.0	U	2.0	U			F
Silver	3.0	U	3.0	U	3.0	U	3.0	U			P
Sodium	11.0	U	11.0	U	11.0	U	11.0	U			P
Thallium	2.0	U	2.0	U	2.0	U	2.0	U			F
Vanadium	3.0	U	3.0	U	3.0	U	3.0	U			P
Zinc	5.0	U	5.0	U	5.0	U	5.0	U			P
Cyanide	10.0	U	10.0	U	10.0	U	10.0	U			CN

ENVIRONMENTAL CHEMICAL CORPORATION

3
BLANKS

Lab Name: ENVIR._CHEMICAL_CORP._____

Contract: _____

Work_Order: 5120__ Project: 18800__

Preparation Blank Matrix (soil/water): _____

Preparation Blank Concentration Units (ug/L or mg/kg): _____

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Prepa- ration Blank	C	M
			4	C	5	C	3	C			
Aluminum											NR
Antimony			4.0	U							F
Arsenic			2.0	U							F
Barium											NR
Beryllium											NR
Cadmium											NR
Calcium											NR
Chromium											NR
Cobalt											NR
Copper											NR
Iron											NR
Lead			1.0	U							F
Magnesium											NR
Manganese											NR
Mercury											NR
Nickel											NR
Potassium											NR
Selenium											NR
Silver											NR
Sodium											NR
Thallium			2.0	U	2.0	U					F
Vanadium											NR
Zinc											NR
Cyanide											NR

ENVIRONMENTAL CHEMICAL CORPORATION

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: ENVIR._CHEMICAL_CORP.____

Contract: ____

Work Order: 5120__ Project: 18800__

ICP ID Number: SER# 154390__

ICS Source: _____

Concentration Units: ug/L

Analyte	True		Initial Found			Final Found		
	Sol. A	Sol. AB	Sol. A	Sol. AB	%R	Sol. A	Sol. AB	%R
Aluminum	500000	500000	472700	471077.8	94.2	477946	475984.7	95.2
Antimony								
Arsenic								
Barium		500		482.9	96.6		482.8	96.6
Beryllium		500		456.4	91.3		460.8	92.2
Cadmium		1000		884.4	88.4		882.4	88.2
Calcium	500000	500000	429397	429345.8	85.9	440177	437061.9	87.4
Chromium		500		448.5	89.7		453.4	90.7
Cobalt		500		447.4	89.5		452.9	90.6
Copper		500		496.9	99.4		504.6	100.9
Iron	200000	200000	168528	167748.2	83.9	170634	169115.4	84.6
Lead		1000		979.8	98.0		999.9	100.0
Magnesium	500000	500000	462774	462987.2	92.6	470886	468932.0	93.8
Manganese		500		471.5	94.3		476.9	95.4
Mercury								
Nickel		1000		857.0	85.7		873.7	87.4
Potassium								
Selenium								
Silver		1000		957.3	95.7		963.2	96.3
Sodium								
Thallium								
Vanadium		500		500.2	100.0		513.6	102.7
Zinc		1000		914.5	91.4		922.3	92.2

FORM IV - IN

ILMO2.1

ENVIRONMENTAL CHEMICAL CORPORATION

SAMPLE NUMBER

940325-H009

Customer: _____

Source: _____

WORK ORDER: 858

Location: NAFB-LF01-TP1-S

Analysis: VOLATILE EPA 8240

Matrix:(soil/water) SOIL

Lab Sample ID.: 18802-001

Sample Weight: 5.0 g

Date Sampled: 03/24/94

Extract Volume: 5.0 mL

Date Received: 03/31/94

Column:(packed/cap) Packed

Date Analyzed: 04/06/94

Percent Solid: 96 %

Preparation Batch: VS0406-2

Dilution Factor: 1

Instrument Batch: VS0406-2

Lab Notebook No: 393, Pg. 55

SAMPLE RESULTS

	CAS NO.	COMPOUND	DETECTION LIMITS (µg/kg)	RESULTS	FLAG
1.	74-87-3	Chloromethane	1.0	U	
2.	74-83-9	Bromomethane	1.0	U	
3.	75-01-4	Vinyl Chloride	1.0	U	
4.	75-00-3	Chloroethane	1.0	U	
5.	75-09-2	Methylene Chloride	1.0	U	
6.	67-64-1	Acetone	4.2	U	
7.	75-15-0	Carbon Disulfide	1.0	U	
8.	75-35-4	1,1-Dichloroethene	1.0	U	
9.	75-34-3	1,1-Dichloroethane	1.0	U	
10.	540-59-0	1,2-Dichloroethene	1.0	U	
11.	67-66-3	Chloroform	1.0	U	
12.	107-06-2	1,2-Dichloroethane	1.0	U	
13.	78-93-3	2-Butanone	2.1	U	
14.	71-55-6	1,1,1-Trichloroethane	1.0	U	
15.	56-23-5	Carbon Tetrachloride	1.0	U	
16.	75-27-4	Bromodichloromethane	1.0	U	
17.	78-87-5	1,2-Dichloropropane	1.0	U	
18.	10061-01-5	cis-1,3-Dichloropropene	1.0	U	
19.	79-01-6	Trichloroethene	2.1	U	
20.	124-48-1	Dibromochloromethane	1.0	U	
21.	79-00-5	1,1,2-Trichloroethane	1.0	U	
22.	71-43-2	Benzene	1.0	U	
23.	10061-02-6	trans-1,3-Dichloropropene	1.0	U	
24.	75-25-2	Bromoform	1.0	U	
25.	108-10-1	4-Methyl-2-Pentanone	3.1	U	
26.	591-78-6	2-Hexanone	5.2	U	
27.	127-18-4	Tetrachloroethene	1.0	U	
28.	79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	
29.	108-88-3	Toluene	1.0	U	
30.	108-90-7	Chlorobenzene	1.0	U	
31.	100-41-4	Ethyl Benzene	1.0	U	
32.	100-42-5	Styrene	1.0	U	
33.	1330-20-7	Xylene (total)	1.0	U	
	SURROGATE STANDARD	RECOVERY (%)	ACCEPTABLE	SPIKE (µg/kg)	
34.	1,2-Dichloroethane-d4	104	70-121	50.0	
35.	Toluene-d8	102	81-117	50.0	
36.	Bromofluorobenzene	99	74-121	50.0	

U: Below Detection Limit

ENVIRONMENTAL CHEMICAL CORPORATION

QUALITY CONTROL

SAMPLE NUMBER

N/A

mer. _____

Source: _____

WORK ORDER: 858

Location: N/A

Analysis: VOLATILE EPA 8240

Matrix:(soil/water) Soil

Lab Sample ID.: BLANK

Sample Weight: 5.0 g

Date Sampled: N/A

Extract Volume: 5.0 mL

Date Received: N/A

Column:(packed/cap) Packed

Date Analyzed: 04/06/94

Percent Solid: 100 %

Preparation Batch: VS0406-2

Dilution Factor: 1

Instrument Batch: VS0406-2

Lab Notebook No: 393, Pg. 55

BLANK

CAS NO.	COMPOUND	DETECTION LIMITS ($\mu\text{g/kg}$)	RESULTS	FLAG

ALL COMPOUNDS ARE BELOW DETECTION LIMIT.

SURROGATE STANDARD	RECOVERY (%)	ACCEPTABLE	SPIKE ($\mu\text{g/kg}$)
1,2-Dichloroethane-d4	95	70-121	50.0
Toluene-d8	98	81-117	50.0
Bromofluorobenzene	99	74-121	50.0

ENVIRONMENTAL CHEMICAL CORPORATION

QUALITY CONTROL

SAMPLE NUMBER

940325-H009

Customer: _____

Source: _____

Location: NAFB-LF01-TPI-S

Analysis: VOLATILE EPA 8240

WORK ORDER: 858

Matrix:(soil/water) SOIL

Sample Weight: 5.0 g

Extract Volume: 5.0 mL

Lab Sample ID.: 18802-001 Duplicate

Date Sampled: 03/24/94

Date Received: 03/31/94

Column:(packed/cap) Packed

Percent Solid: 96 %

Dilution Factor: 1

Lab Notebook No: 393, Pg. 55

Date Analyzed: 04/06/94

Preparation Batch: VS0406-2

Instrument Batch: VS0406-2

DUPLICATE

COMPOUND	DETECTION LIMIT ($\mu\text{g/kg}$)	SAMPLE RESULT ($\mu\text{g/kg}$)	DUPLICATE RESULT ($\mu\text{g/kg}$)	FLAG

ALL COMPOUNDS ARE BELOW DETECTION LIMIT.

SURROGATE STANDARD	SAMPLE RECOVERY (%)	DUPLICATE RECOVERY (%)	ACCEPTABLE	SPIKE ($\mu\text{g/kg}$)
1,2-Dichloroethane-d4	104	109	70-121	50.0
Toluene-d8	102	115	81-117	50.0
Bromofluorobenzene	99	82	74-121	50.0

U: Below Detection Limit

ENVIRONMENTAL CHEMICAL CORPORATION

QUALITY CONTROL

SAMPLE NUMBER

940325-H009

Date: _____
 Source: _____ WORK ORDER: **858**
 Location: NAFB-LF01-TPI-S
 Analysis: VOLATILE EPA 8240
 Matrix (soil/water): SOIL Lab Sample ID.: 18802-001
 Preparation Batch: VS0406-2 Instrument Batch: VS0406-2

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

COMPOUND	SPIKE ADDED (µg/kg)	SAMPLE CONC. (µg/kg)	MS CONC. (µg/kg)	% REC #	QC LIMITS % REC.
1,1-Dichloroethene	52.1	0.0	57.8	111	59-172
Trichloroethene	52.1	0.0	67.5	130	62-137
Benzene	52.1	0.0	68.5	131	66-142
Toluene	52.1	0.0	64.7	124	59-139
Chlorobenzene	52.1	0.0	52.1	100	60-133

COMPOUND	SPIKE ADDED (µg/kg)	MSD CONC. (µg/kg)	MSD % REC	% RPD #	QC LIMITS	
					RPD	REC.
1,1-Dichloroethene	52.1	59.0	113	2	22	59-172
Trichloroethene	52.1	65.7	126	3	24	62-137
Benzene	52.1	70.3	135	3	21	66-142
Toluene	52.1	64.3	123	1	21	59-139
Chlorobenzene	52.1	54.2	104	4	21	60-133

Column to be used to flag recovery and RPD values with an asterisk
values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits

ENVIRONMENTAL CHEMICAL CORPORATION

QUALITY CONTROL

SAMPLE NUMBER

Customer: _____

N/A

Source: _____

WORK ORDER: 858

Location: _____

N/A

Analysis: _____

VOLATILE EPA 8240

Matrix: (soil/water)

Soil

Lab Sample ID.: _____

18802-LCSS

Preparation Batch: _____

VS0406-2

Instrument Batch: _____

VS0406-2

LABORATORY CONTROL SAMPLE

COMPOUND		TRUE VALUE ($\mu\text{g/kg}$)	FOUND ($\mu\text{g/kg}$)	% REC #	QC LIMITS % REC.
1,1-Dichloroethene		50.0	43.2	86	59-172
Trichloroethene		50.0	58.4	117	62-137
Benzene		50.0	53.0	106	66-142
Toluene		50.0	57.7	115	59-139
Chlorobenzene		50.0	54.9	110	60-133

Column to be used to flag recovery values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits

COMMENTS:

GC/MS PERFORMANCE STANDARD

Bromofluorobenzene (BFB)

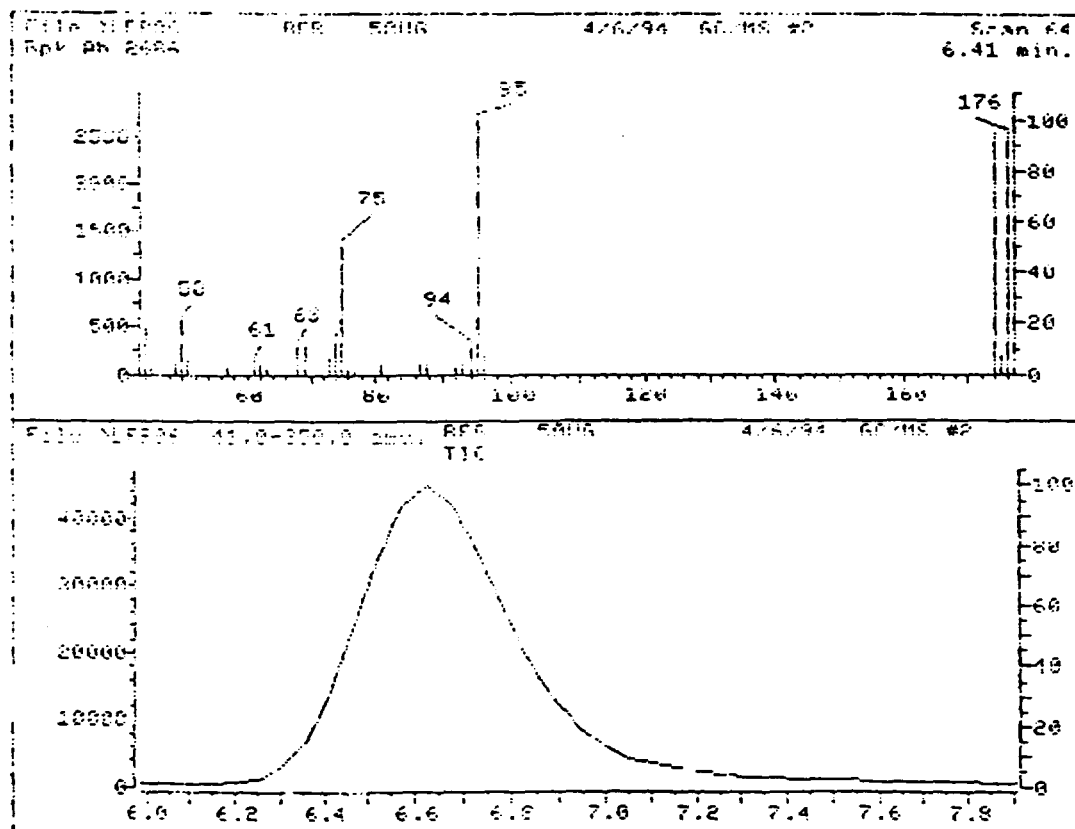
m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.11	21.11	Ok
75	30-60% of mass 95	50.19	50.19	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	7.04	7.04	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	94.38	94.38	Ok
175	5-9% of mass 174	6.89	7.30	Ok
176	95-101% of mass 174	94.56	100.20	Ok
177	5-9% of mass 176	6.70	7.09	Ok

Injection Date: 04/06/94

Injection Time: 07:58

Data File: >LF806

Scan: 64



Continuing Calibration Check
HSL Compounds

Case No:	Calibration Date: 04/06/94
Contractor: EDC	Time: 09:01
Contract No:	Laboratory ID: 04PR06
Instrument ID: 2716A10254	Initial Calibration Date: 02/23/94

Minimum RF for SPOC is 0.300 Maximum % Diff for CCC is 25%

Compound	RF	RF	%Diff	CCC SPOC
Chloromethane	.63869	.52268	18.16	**
Dichlorodifluoromethane	2.33347	1.50286	35.68	
Bromomethane	.61681	.59917	2.86	
Vinyl Chloride	.66623	.51315	22.98	*
Chloroethane	.44580	.40614	8.98	
Ethanol	-	-	-	
Iodomethane	-	-	-	
Methylene Chloride	1.52161	1.48629	2.32	
Acrylonitrile	.19483	.15214	21.92	
Acrolein	-	-	-	
Acetone	.25454	.29691	16.65	
Carbon Disulfide	2.79607	3.00525	7.50	
Trichlorofluoromethane	2.76060	2.33588	15.38	
Ethyl methacrylate	-	-	-	
Tetrahydrofuran	-	-	-	(Conc=50.00)
1,1-Dichloroethene	1.99397	1.70743	14.37	*
1,1-Dichloroethane	2.13535	2.84138	4.40	**
cis-1,2-Dichloroethene	1.98861	1.83737	7.61	
Ethyl ether	-	-	-	
Trichlorotrifluoroethane	-	-	-	
Chloroform	2.97644	3.12604	5.03	*
1,2-Dichloroethane-d4	1.70037	1.65809	2.49	
1,2-Dichloroethane	1.92138	1.89315	1.47	
Dibromomethane	.54429	.54991	1.03	
2-Butanone	.14694	.09708	33.93	
1,1,1-Trichloroethane	.98328	.93501	4.91	
Ethyl Acetate	.02136	.05334	149.71	(Conc=100.00)
1,4-Dioxane	-	-	-	(Conc=50.00)
Carbon Tetrachloride	.97553	.88887	8.97	
Vinyl Acetate	.32391	.10338	68.09	
n-Butanol	-	-	-	(Conc=3750.00)
Bromodichloromethane	.98540	.95467	3.12	

RF - Response Factor from daily standard file at 50.00 ug/L

* - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPOC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____	Calibration Date: 04-06/94
Contractor: EDC	Time: 09:01
Contract No: _____	Laboratory ID: 14PR06
Instrument ID: 2716A10254	Initial Calibration Date: 02/23/94

Minimum RF for SPOC is 0.300

Maximum % Diff for CCC is 25%

Compound	RF	RF	%Diff	CCC	SPOC
1,2-Dichloropropane	.35090	.34460	1.79	*	
cis-1,3-Dichloropropene	.56815	.48308	14.97		(Conc=53.00)
Trichloroethene	.53360	.47107	11.72		
Dibromochloromethane	.62155	.57432	7.60		
1,1,2-Trichloroethane	.30932	.31774	2.72		
Benzene	.79555	.75875	4.63		
trans-1,3-Dichloropropene	.47548	.38918	18.15		(Conc=47.00)
2-Chloroethylvinylether	.13401	.12651	5.60		
1,2-dibromoethane	-	-	-		(Conc=50.00)
1,2-Dibromoethane form	.57779	.45482	21.28	**	
2-Pentanone	.26577	.29508	11.03		
1,2,3 Trichloropropane	.51815	.72247	39.43		
Hexanone	.15870	.24458	54.12		
Tetrachloroethene	.61137	.73564	20.33		
1,1,2,2-Tetrachloroethane	.67818	.89753	33.92	**	
1,4 Dichloro 2 butane	-	-	-		
Toluene	1.09710	1.33338	21.54	*	
Toluene-d8	1.06918	1.38932	29.94		
Chlorobenzene	.93649	1.23420	31.79	**	
Ethylbenzene	1.38874	1.63674	17.86	*	
1,2-Dibromo-3-Chloropropane	-	-	-		(Conc=50.00)
Bromofluorobenzene	.89316	1.22216	36.84		(Conc=50.00)
Styrene	.78052	1.27689	63.59		
Xylene (total)	.90252	1.78969	98.39		(Conc=150.00)
1,3-Dichlorobenzene	1.01769	1.87657	84.40		
1,2-Dichlorobenzene	.84604	1.08130	27.81		
1,4-Dichlorobenzene	.84604	.94299	11.46		
m-Xylene	-	-	-		
p-Xylene	-	-	-		
1,2,4-Trimethylbenzene	-	-	-		
1,3,5-Trimethylbenzene	-	-	-		
o-Xylene	-	-	-		

RF - Response Factor from daily standard file at 50.00 ug/L

r - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CC - Calibration Check Compounds (*) SPOC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 04/06/94
Contractor: EDC _____ Time: 09:01
Contract No: _____ Laboratory ID: >APR06
Instrument ID: 2716A10254 _____ Initial Calibration Date: 02/23/94

Minimum RF for SPOC is 0.300 Maximum % Diff for CCC is 25%

Compound	RF	RF	%Diff	CCC SPOC
Isopropyl Benzene	-	-	-	
Sec-Butyl Benzene	-	-	-	
n-Chlorotoluene	-	-	-	
i-Butylbenzene	-	-	-	
n-Propylbenzene	-	-	-	
n-Butylbenzene	-	-	-	
Hexachlorobutadiene	-	-	-	(Conc=100.00)

RF - Response Factor from daily standard file at 50.00 ug/L

RF - Average Response Factor from Initial Calibration Form UI

%Diff - % Difference from original average on curve

CCC - Calibration Check Compounds (*) SPOC - System Performance Check Compounds (**)

ENVIRONMENTAL CHEMICAL CORPORATION

Lab Name: Environmental Chemical Corporation

Lab Proj. No.: 18802

Customer: _____

Work Order: 858

Lab File ID (Standard): >APR06

Date Analyzed: 04/06/94

Instrument ID: 2716A10254

Time Analyzed: 09:01

GC Column: PACK ID: 2 (mm)

Heated Purge (Y/N): N

Preparation Batch No.: VS0406-2

Instrument Batch No.: VS0406-2

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

	IS1 (PFB) AREA #	RT #	IS2 (DFB) AREA #	RT #	IS3 (CBZ) AREA #	RT #
12 HOUR STANDARD	24866	8.58	72550	18.92	42276	23.72
UPPER LIMIT	49732	9.08	145100	19.42	84552	24.22
LOWER LIMIT	12433	8.08	36275	18.42	21138	23.22
SAMPLE NO.						
1. SOIL BLANK	23252	8.56	63194	18.93	44001	23.75
2. LCSS	19549	8.53	57316	18.93	38955	23.72
3. 940325-H009	16308	8.56	46037	18.96	30813	23.75
4. 940325-H009D	14820	8.54	45811	18.94	25400	23.74
5. 940325-H009MS	13463	8.55	40272	18.92	21532	23.72
6. 940325-H009MSD	13257	8.56	37261	18.93	21864	23.75

IS1 (PFB) = Pentafluorobenzene
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

Column used to flag internal standard area values with an asterisk.

* Values outside of QC limits.

AREA UPPER LIMIT = + 100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area

APPENDIX B

SITE SAFETY HEALTH PLAN

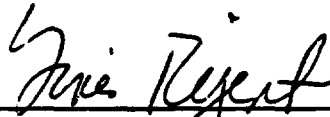
**LOCATION-SPECIFIC SAFETY AND HEALTH PLAN FOR
PREPLACED LEAD CONTAMINATION REMEDIATION
FOR NL INDUSTRIES/TARACORP SUPERFUND SITE
IN GRANITE CITY, MADISON, AND VENICE, ILLINOIS
DACW45-89-D-0506; DELIVERY ORDER NO. 0017**

Submitted to:

Department of the Army
Corps of Engineers
Chicago, Illinois

Prepared by:

OHM Remediation Services Corp.



Gina Rejent
Industrial Hygienist
Midwest Region



Bill R. Thomas, CIH, CHP
Health & Safety Manager
Midwest Region

August 5, 1994
Project 16473

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1.0 INTRODUCTION

OHM Remediation Services Corp. (OHM), a wholly owned subsidiary of OHM Corporation, has been contracted to excavate and to dispose of lead contaminated fill material placed in alleys, parking lots, driveways, and yards in residential communities located in Granite City, Madison, and Venice, Illinois.

1.1 LOCATION HISTORY

The NL site includes the NL Industries/Taracorp Plant, a former secondary lead smelting operation facility, located at 16th Street and Cleveland Blvd. in Granite City, Illinois. Metal refining, fabricating, and associated activities had been conducted at the plant since before the turn of the century. Prior to 1903, the plant included a shot tower, machine shop, factory for the manufacture of blackbird targets, sealing wax, manufacture of mixed metals, refining of drosses, and the rolling of sheet lead. From 1903 to 1983, secondary lead smelting occurred on-location. Secondary smelting facilities included a blast furnace, a rotary furnace, several lead melting kettles, a battery breaking operation, a natural gas-fired boiler, several baghouses, cyclones, and an afterburner. Secondary lead smelting operations were discontinued during 1983 and the equipment was dismantled.

In July of 1981, St. Louis Lead Recyclers, Inc. (SLLR) began using equipment on adjacent property owned by Trust 454 to separate components of the Taracorp waste pile. The objective was to recycle lead-bearing materials to the furnaces at Taracorp and send hard rubber and plastic off-location for recycling. SLLR continued operations until March 1983 when it shut down operation. Residuals from the operation remain on Trust 454 property as does some equipment.

A State Implementation Plan for Granite City was published in September 1983 by the Illinois Environmental Protection Agency (IEPA). The IEPA's report indicated that the lead nonattainment problem for air emissions in Granite City was in large part attributable to emissions associated with the operation of the secondary lead smelter operated by Taracorp and lead reclamation activities conducted by SLLR. The IEPA procedure administrative orders by consent with Taracorp, St. Louis Lead Recyclers Inc., Stackcorp, Inc., Tri-City Truck Plaza Inc., and Trust 454 during March 1984. The orders required the implementation of remedial activities relative to the air quality.

NL Industries (NL), as former owner of the site, voluntarily entered into an agreement and administrative order by consent with the U.S. Environmental Protection Agency (U.S. EPA), and IEPA in May 1985 to implement a remedial investigation and feasibility study (RI/FS) for that location and other potentially affected areas. Taracorp was not a party to the agreement due to bankruptcy. The U.S. EPA determined that the site was a CERCLA facility and it was placed on the National Priorities List on June 10, 1986.



This remediation activity shall require the excavation and disposal of fill material placed in alleys, parking lots, driveways, and yards in residential communities (namely Eagle Park Acres and Venice Township Alleys). Determination and disposal of hazardous versus non-hazardous waste will be based on Woodward Clyde data. The communities include Granite City, Madison, and Venice, Illinois.

Based on the Record of Decision, the action levels for clean-up established for this action shall be 500 parts per million (ppm). Following the removal of the contaminated material, the impacted areas shall be restored. This restoration shall include sodding the yards, and paving the alleys, driveways, and parking lots.

1.2 REGULATORY REQUIREMENTS

All site investigation/removal activities shall comply with and reflect the following regulations and appropriate guidance publications, as a minimum:

- Federal Acquisition Regulation, F.A.R., Clause 52.236-13: Accident Prevention;
- United States Army Corps of Engineers (USACE), Safety and Health Requirements Manual, EM 385-1-1 (latest revision);
- Occupational Safety and Health Administration (OSHA) Construction Industry Standards, 29 CFR 1926; and General Industry Standards, 29 CFR 1910; especially 29 CFR 1926.65, "Hazardous Waste Site Operations and Emergency Response"; and Lead Standards, 29 CFR 1926.62 Appendices A and B must be covered and made available to employees during initial safety meeting.
- NIOSH/OSHA/USCG/USEPA, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," October 1985;
- Title 40, Code of Federal Regulations, USEPA Standards;
 - Part 61 National Emission Standards for Hazardous
 - SubpartA Air Pollutants-General Provisions
 - SubpartM Air Pollutants-National Emission Standard for Asbestos;and
- Other applicable federal, state, and local safety and health requirements.

1.3 APPLICABILITY OF THE LOCATION-SPECIFIC SAFETY AND HEALTH PLAN

This Location-Specific Safety and Health Plan (LSSHP) is prepared in accordance with the standards established by OSHA for hazardous waste sites. Specifically, this SSHP complies with the appropriate sections of 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response."



1.0 INTRODUCTION

Additionally, this SSHP details the health and safety measures that shall be implemented at the beginning of the project and effective for the duration of the project. This document is intended for field use by OHM personnel and subcontractors and these personnel are required to abide by it. Where not specifically mentioned, OHM will follow all pertinent regulations contained in 29 CFR 1910, and 1926, and USACE EM-385-1-1 in conducting this work.

This document may require revision as the project progresses. All revisions must be approved by the OHM Midwest Region Health and Safety Manager. Revisions must be made in writing and incorporated into the document or attached as an amendment to this document.

It is the goal of OHM to successfully complete this project with all due regard and respect for appropriate professional safety protocol. It is also OHM's objective to complete the entire project without logging any OSHA-recordable accidents.

1.4 VISITORS

Visitor access to regulated project areas such as the exclusion and contamination reduction zones shall be restricted. The following criteria must be met for visitors to gain access to these areas:

- Visitors must provide proof of participation in a medical surveillance program that complies with requirements stated in 29 CFR 1910.120 (f);
- Visitors must provide proof of training accomplishment equivalent to standards set forth in 29 CFR 1910.120 (e). This training must have been received within 1 year from the date of desired access. Some visitors may be required to show proof of the specified 8-hour refresher training within the same time frame;
- Visitors must read the SSHP and sign the form contained in Appendix A. By signing the form, visitors agree to comply with all specifications contained in the SSHP and agree to comply with all applicable OSHA requirements; and
- Visitors who do not adhere to these requirements shall not be allowed access and/or be requested to leave the regulated work areas.

1.5 WORK AREA LOCATIONS

Various residential properties located within Granite City, Madison, and Venice, Illinois will be the locations for removal of contaminated material. Refer to Appendix B for maps showing the location of each area.



1.6 AREA SOIL TYPE/TOPOGRAPHY

This project involves work in a number of different locations, which includes a potential for variation in soil type/topography. The following information describes areas that might be encountered in Granite City, Madison, and Venice, Illinois.

- Urban land, bottom land with 0 to 3 percent slopes--The locations consist of areas in which more than 85 percent of the surface is covered by asphalt, concrete, buildings, or other impervious materials. Parking lots, shopping and business centers, railroad yards, and industrial parks are examples. They occur throughout the area, except the western part. Most areas are small; the largest are in the city of St. Louis near the Mississippi River and along the Meramec River upstream from the city of Fenton. The areas originally were bottom land or terrace land. Many of them have been built up with fill material to elevate them above normal flood levels. However, they are subject to inundation for short periods by local flooding, and extremely large floods cover some areas of this unit for long periods. Individual areas generally range from 30 to 500 acres.

Composition of the soil material capable of supporting vegetation is quite variable. The vegetation is primarily ornamental trees, shrubs, and lawn grasses.

The amount of fill in these areas ranges from non on some terrace positions at a higher elevation to more than 20 feet on former swampy areas near the Mississippi River in the northern part of the city of St. Louis. Identification of the soils and soil-like materials in this unit is impractical because of variability.

These areas are not assigned to a capability subclass.

- Urban land-Harvester areas with 0 to 2 percent slopes--Other areas consist of Urban land and the intermingles areas of nearly level, moderately well drained Harvester soils. It is on broad upland divides in the city of St. Louis and in the eastern and northern parts of St. Louis County. Individual areas are irregular in shape and range from about 30 to 900 acres. They are about 65 percent Urban land and 30 percent Harvester soils. The Urban land and Harvester soils are intermingled.

The urban land part of this complex is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification of the series is not feasible.

Typically, the surface layer of the Harvester soil is brown silt loam about 4 inches thick. The next layer, to a depth of about 37 inches, consists of multicolored silt loam and silty clay loam fill material that contains fragments



of bricks, glass, cinders, and other manmade materials. Below the reworked fill material to a depth of about 60 inches is the lower part of a buried soil. It is dark yellowish brown, mottled, firm silty clay loam. In places, the fill material is more than 40 inches thick, or part of all of the original soil has been removed during land shaping, or the surface layer is silty clay loam, or one or more soil layers contain more than 20 percent coarse fragments.

Included in these areas and making up about 5 percent are small areas of well drained Menfro soils, moderately well drained Winfield soils, and somewhat poorly drained Iva soils. These soils are in parks, playgrounds, and a few open spaces between buildings.

The Urban land is impervious to water. Permeability is moderately slow in the Harvester soils. Surface runoff is slow in the areas. The natural fertility is medium, and organic matter content is very low. The surface layer of the Harvester soils is friable.

The Harvester soil in the areas is in yards, open spaces between building, parks, playgrounds, gardens, and undeveloped random tracts. Recreation uses are suitable if they can be adapted to the limited size and shape of the open spaces (and/or to the slope). Permeability is a moderate limitation for camp and picnic areas and playgrounds. Good surface drainage is needed, and areas of heavy foot traffic need resurfacing with suitable material.

The Harvester soils are suitable for building sites. Proper design of structures and extra reinforcement in footings, foundations, and basement walls are necessary to prevent damage caused by shrinking and swelling. Drain tile around footings and foundations helps overcome excessive wetness. Community sewers are the chief means for the disposal of waste. Adequate base material for local roads and streets and proper drainage with side ditches and culverts, or tile drains and storm sewers, are needed to prevent damage caused by low strength and frost action.

The areas are not assigned to a capability subclass.

- Urban land-Harvester area with 2 to 9 percent slopes--The area consists of Urban land and the intermingled areas of gently sloping and moderately sloping, moderately well drained Harvester soils. It is on ridgetops and side slopes on uplands. Individual areas are irregular in shape and range from about 20 to 400 acres. They are about 65 percent Urban land and 30 percent Harvester soils. The Urban land and Harvester soils are intermingled.

The Urban land for these areas is similar to those described in the previous section (0 to 2 percent slopes).



Typically, the surface layer of the Harvester soil is very dark grayish brown silt loam about 4 inches thick. The next layer, to a depth of about 25 inches, consists of multicolored silt loam and silty clay loam fill material that contains cinders. Below the reworked fill material to a depth of about 60 inches is buried soil. It is brown and pale brown silt loam in the upper part and yellowish brown and dark yellowish brown, firm silty clay loam in the lower part. In places, the fill material is more than 40 inches thick. Also in places, part or all of the original soil has been removed during land shaping, or the surface layer is silty clay loam, or the fill material contains more than 20 percent fragments of manmade materials.

The characteristics/specifications for Urban land and Harvester soil are the same as those outlined for the previous classification (Urban land-Harvester areas with 0 to 2 percent slopes); however, these areas encounter rapid surface runoff due to their increased slopes.

- Urban land-Harvester areas with 9 to 20 percent slopes--The area consists of Urban land and the intermingled areas of strongly sloping and moderately steep, moderately well drained Harvester soils. It is on uplands on the side slopes of valleys. Individual areas are irregular in shape and range from about 10 to 120 acres. They are about 50 to 60 percent Urban land and 20 to 30 percent Harvester soils. The Urban land and harvester soils are intermingled.

The Urban land areas for this land classification are similar to those outlined in the previous two sections.

Typically, the surface layer of the Harvester soil is dark brown silt loam about 3 inches thick. The next layer, to a depth of about 33 inches, consists of multicolored silt loam, silty clay loam, and clay fill material that contains sandstone fragments in the lower part. Below the reworked fill material to a depth of about 60 inches is a buried soil. It is yellowish brown, firm silty clay loam in the lower part. In places, the fill material is more than 40 inches thick. Also in places, part or all of the original soil has been removed during land shaping, or the surface layer is silty clay loam, or the fill material contains more than 20 percent fragments of manmade materials.

Included with the areas and making up about 20 percent of the total areas are small areas of well drained Menfro soils and moderately well drained Winfield soils along drainageways, in part, and in a few open spaces between buildings. Also included are a few small areas that have chert or bedrock exposed at the surface and a few areas along drainageways that have a slope of more than 20 percent.



The Urban land is impervious to water. Permeability is moderately slow in the Harvester soils. Surface runoff is rapid, to very rapid in these areas. The natural fertility is medium, and organic matter content is very low. the surface layer of the Harvester soils is friable.

The Harvester soils in this complex are in yards, open spaces between buildings, parks, gardens, and undeveloped tracts primarily adjacent to drainageways. Recreation uses are suitable if they can be adapted to the limited size and shape of the open spaces and to the slope. The slope is a severe limitation. On-site investigation is needed in areas being considered for recreation uses.

The characteristics/specifications for Harvester soils in these areas are the same as those outlined for the previous sections.

The communities of Granite City, Madison, and Venice, Illinois present a variety of residential and industrial areas. Some areas include wooded parks and fields. Work in the different locations will involve an evaluation of the area and necessary precautions once crews are on-location. Area maps (Appendix B), help distinguish the different areas.

1.7 SCOPE OF WORK

The scope of work for all sites in this remediation project is included in the summary below:

- Mobilization;
- Installation of perimeter fence;
- Bag and stockpile non-hazardous material;
- Soil sampling;
- Excavation of contaminated soil and/or battery case material;
- Backfill of excavations;
- Soil load-out activities;
- Restoration of disturbed areas; and
- Decontamination and demobilization.

1.8 MANAGEMENT ORGANIZATION

The OHM management organization on this project will be as follows:

- Site Supervisor--All personnel working on the project ultimately report to this individual who has authority over all phases and is the senior OHM on-site representative. The site supervisor is the primary safety official for this project and is responsible for ensuring the SSHP is properly implemented and all activity is performed in a healthful and safe manner. It is the duty of the



- site supervisor to perform weekly safety inspections of the project and to monitor the safety performance of all personnel on a daily basis. The site supervisor is the designated competent person should any excavation exceed 4 feet in depth.
- General Foreman--This individual's duty is to disseminate information, assign tasks, and coordinate efforts between the multiple OHM crews. This person reports directly to the site supervisor.
- Foreman--This individual's duty is to coordinate and monitor the activities of a specific work crew. This person reports to the general foreman.
- Recovery Technician--This individual safely completes the on-site tasks required to fulfill the work plan, complies with the SSHP, and notifies the HSO of unsafe conditions. This person reports to the foreman.
- Site Health and Safety Officer (HSO)--This individual is delegated the responsibility to assist the site supervisor in the implementation and enforcement of the safety and health program and site-specific plan elements on-location. The HSO is also responsible for monitoring the effectiveness of the SSHP, air monitoring, accident reporting, etc. He/she has the authority to temporarily cease any project phase or operation deemed either inherently dangerous to life and health or not in compliance with the SSHP. In addition, he/she can cause the removal of any person who is deemed inherently unsafe or a threat to the safety of other individuals at or in the vicinity of the project. The HSO reports to the site supervisor and the Regional Health and Safety Manager.
- Certified Industrial Hygienist (CIH)-- The Regional Health and Safety Manager is the project CIH. This individual, being experienced in hazardous waste material operations, is responsible for the development, implementation, and oversight of the Safety and Health Program and SSHP.



2.0 RESPONSIBLE AUTHORITIES

The following people are responsible for safety and health on this project:

- Site Supervisor Tom Seem
- Site Health and Safety Officer (HSO) Mark Sackman
- Regional Health and Safety Manager Bill Thomas, CIH CHP
419-424-4960
- Project Manager Larry Hoffman
419-423-3526
800-537-9540
- Executive Vice President, Midwest Region Daniel P. Buettin
419-424-4960
- Vice President of Health and Safety Fred Halvorsen, Ph.D.,
P.E., CIH
419-424-4910

Additionally, as stated in the OHM Employee Safety Guide, each employee is responsible for his own personal safety and the safety of his co-workers.



3.0 PROJECT HAZARDS

The general categories of hazards that may be present at each designated project location in Eagle Park Acres and Venice alleys are described in this section. The main divisions of health hazards at these locations are chemical, physical, and environmental. The pathways for hazardous substance dispersion at this project are personnel and equipment tracking, and migration via dust/dirt in the air.

3.1 CHEMICAL HEALTH HAZARDS

Preventing exposure to toxic chemicals is a primary concern at this hazardous material remediation project. This project contains a variety of chemical substances; however, with the exception of fuels, these will be found mostly as solids in the soils. These substances can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systemically, causing a toxic effect at a part of the body distant from the point of initial contact. A summary of the generalized chemical health hazards expected at this project is presented below.

3.1.1 Lead

Lead, at this project, will be in the soil and exposure could be from inhalation, oral ingestion, or contact exposure. It is to be noted that inhalation of lead contaminated particulates (dust) is a hazard for all work related tasks on this project. The symptoms and effects of exposures to lead are summarized as follows:

- Acute Exposure--Short-term, high concentration exposure to lead by unprotected personnel causes eye, nose, and throat irritation. A slight metallic taste and severe gastric disturbances have been noted by some people.
- Chronic Exposure--Workers in other industries, such as foundries or metal refining operations, who have long-term exposure without, or with limited benefit of protective equipment, have been found to have liver, kidney, and central nervous system impairment.

Since lead is a solid metal with a melting point of 621°F and a molecular weight of 207.2, the vapor pressure for lead is approximately 0 mm. Guidelines for ionization potential, odor threshold, and flammability ranges are not applicable.



The following exposure limits have been established for lead and must not be exceeded:

COMPOUND	OSHA-PEL	NIOSH-REL	ACGIH-TLV
Lead	0.05 mg/m ³	<0.1 mg/m ³	0.15 mg/m ³

All workers should be aware of strange odors, irritation, and feelings of discomfort or extreme well being. Often these signs can indicate chemical exposure is occurring.

A Material Safety Data sheet (MSDS) is attached in Appendix c, which describes in more detail, the chemical, physical, and health hazards posed by lead.

3.1.2 Metals

The metals listed below may exist on-location but should be at significantly lower concentrations than the lead. These can also affect unprotected personnel through ingestion, inhalation, and dermal contact. The metal constituents of concern and exposure limits are outlined below:

HEAVY METAL	OSHA-PEL	ACGIH-TLV
Arsenic	0.01 mg/m ³	0.01 mg/m ³
Barium	0.5 mg/m ³	0.5 mg/m ³
Cadmium	0.2 mg/m ³	0.01 mg/m ³
Chromium	1.0 mg/m ³	0.5 mg/m ³
Manganese	5.0 mg/m ³ (C)	5.0 mg/m ³
Mercury	0.01 mg/m ³	0.01 mg/m ³
Nickel	1.0 mg/m ³	1.0 mg/m ³
Selenium	0.2 mg/m ³	0.2 mg/m ³
Silver	0.01 mg/m ³	0.01 mg/m ³
Zinc	5.0 mg/m ³	5.0 mg/m ³

NOTE: The OSHA (C) notation denotes a Ceiling Limit, which is the concentration that should not be exceeded at any time during the course of work.



Acute and chronic exposures to heavy metals above the exposure limits can be summarized as follows:

- Acute Exposure—eye, nose, and throat irritation, coughing, upset stomach, nausea, shortness of breath, weakness, chills and fever, headache, hoarseness, diarrhea, coughing up blood, skin rash.
- Chronic Exposure--Poor coordination, difficulty in speaking, tremor (shakes), kidney damage, liver damage, unstable emotions, recurring chills and fever, and possible carcinogen.

The appropriate site-specific MSDSs are included in Appendix C.

3.1.3 Petroleum Distillates and Cleaning Compounds

Operational compounds such as fuels for heavy equipment will be used to complete this project. Aside from some petroleum distillates (fuels) being **EXTREMELY FLAMMABLE** and cleaning compounds being potentially corrosive, personnel must also recognize the health hazards associated with these compounds. The health hazards associated with these materials and acute and chronic exposure symptoms are summarized as follows:

- Petroleum distillates that will be used as fuel (depending on product, odor of gasoline or kerosene may be noted)
 - Acute exposure--Dizziness, nausea, weakness, euphoria (feeling good), mild skin irritation, inhalation of concentrated vapors or aspirated liquids can cause death by chemical pneumonia
 - Chronic exposure--skin irritation; damage to liver, kidneys, and blood compounds; leukemia (benzene)
- Cleaning compounds which may be used by site personnel for equipment decontamination purposes (cleaning compounds can have a pungent, irritating, or scented odor)
 - Acute exposure--Skin, eye, nose, and throat irritation
 - Chronic exposure--Undetermined but continuing skin irritation is possible, damage to the respiratory tract

Primary exposure routes for these materials include inhalation, ingestion, and skin contact. Personnel must be alert for signs and symptoms of possible exposure and must immediately report them to the site supervisor and/or HSO.



MSDS's for materials brought on location are found in OHM's written Hazard Communication Program, found in the project office trailer.

3.1.4 Hazard Communication

The purpose of hazard communication (employee Right-to-Know) as required by 29 CFR 1926.59, is to ensure that the hazards of all chemicals used to complete this field project are communicated to all OHM personnel and OHM subcontractors. Hazard communication includes the following:

- Container Labeling--OHM personnel must ensure that all drums and containers are labeled according to contents. These drums and containers will include those from manufacturers and those produced on-location by operations personnel. All incoming and outgoing labels must be checked for identity, hazard warning, and name and address of responsible party.
- MSDS--There must be a MSDS available on-location for each hazardous chemical used. MSDSs for all chemicals brought and used on-location are provided in the OHM's Written Hazard Communication Program, which can be found in the project office trailer. MSDS's for location-specific chemicals can be found in Appendix B of this plan. A master-list of all MSDS's is included on the cover sheet.
- Employee Information and Training--Training employees on chemical hazards is accomplished through an ongoing corporate training program. Additionally, chemical hazards must be communicated to employees through daily safety meetings held at OHM field projects and/or by an initial project orientation program.

At a minimum, personnel must be instructed on the following:

- Chemicals and their hazards in the work area;
- How to prevent exposure to these hazardous chemicals;
- Mechanisms to prevent workers' exposure to these chemicals;
- Procedures to follow if they are exposed to these chemicals;
- How to read and interpret labels and MSDSs for hazardous substances found on OHM sites;
- Emergency spill procedures; and
- Proper storage and labeling.



Before any new hazardous chemical is introduced on-location, each employee must be given information in the same manner as during the safety class. The site supervisor will be responsible for seeing that the MSDS on the new chemical is available. The information pertinent to the chemical hazards will be communicated to project personnel.

Morning safety meetings are to be held and the hazardous materials used on-location will be discussed. Attendance is mandatory for all personnel.

- **Subcontractor Information and Training**--It shall be the responsibility of the site supervisor to ensure that all subcontractors coming onto project locations be informed of the hazardous chemicals present, effects of exposure, location of MSDS, location of emergency equipment (i.e., eye wash, fire extinguisher), and emergency spill and evacuation procedures. By signing the SSHP acknowledgment form, located in Appendix A of the SSHP, the subcontractor is acknowledging receipt of all of this information. The site supervisor shall also ensure that subcontractors submit information on chemicals that they are responsible for introducing to the project area. all chemicals introduced to these areas must be accompanied by the appropriate MSDS. This information can be exchanged at the daily morning safety meeting. These meetings must be attended by all subcontractors.

3.2 PHYSICAL HAZARDS

There are many physical hazards associated with this project. Hazard identification, training, adherence to work rules, and careful housekeeping can prevent many problems or accidents arising from physical hazards. The following text outlines the physical hazards associated with this project and suggested preventative measures;

- **Mechanical/Electrical Energy**--Lockout and tagout procedure may need to be applied for specific work at this job. In the event that some operation requires lockout and tagout procedures, review and apply the standard operating procedures presented in Appendix D.
- **Bulky or Heavy Loads**--Intelligent thought shall be exercised before heavy and bulky loads are lifted or handled manually by personnel. Mechanical equipment such as forklifts, wheel barrows, hand-trucks, loaders, and cranes shall be utilized when possible and needed. **Note: Back injuries are real, debilitating, unproductive, and costly to both employees and employers, and sometimes permanent. Back injury prevention must be given high priority on all project sites. If you think the load you are about to lift is too heavy or bulky, it probably is - get help or utilize mechanical equipment, or do not attempt to lift it.**



- Hoisting Accidents--Employees can have suspended loads dropped on the, or be caught or smashed between a load and a stationary object. All hoisting must be done by qualified personnel only after inspections are made and documented, of chokers, slings, and cables. In addition, no hoisting will take place without a designated signal man present. Chains are not appropriate for vertical lifts.
- Small Quantity Flammable/Combustible Liquids--Small quantities of flammable/combustible liquids must be properly stored in "safety" cans with appropriate flame arresters, and labeled according to contents.
- Bulk Fuel Storage--A bulk fuel storage area must be designated for storage of bulk fuels and other flammable materials. The bulk fuel vessels must be grounded and have bonding cables attached. The area must be prominently posted as "flammable" and no smoking sign erected. At least one 20-pound dry chemical, ABC-type fire extinguisher must be available in this area.
- Heavy Equipment--Each morning before startup, all heavy equipment must be inspected to ensure all safety equipment and devices, (e.g., backup alarms, brakes, control levers, and fire extinguishers) are operational or ready for immediate use. Only qualified personnel may operate this equipment. Before crossing either in front of or behind a piece of heavy equipment, the ground personnel will signal the equipment operator and receive confirmation before moving. During excavation activity, the swing-radius area of excavators should be marked and personnel should be prohibited in this area.
- Slip/Trip/Fall Hazards--All ground personnel should be constantly aware of the possibility of slip, trip, and fall hazards due to poor and possibly slippery footing in the work areas. Some areas may have wet surfaces, which will greatly increase the possibility of inadvertent slips. Caution must be exercised when using steps and stairs due to slippery surfaces in conjunction with the fall hazards. Since all stairs with 4 or more risers are equipped with handrails, one would be wise to use them. Good housekeeping practices are essential to minimize the trip hazards.
- Electrical Hazards--Electrical devices and equipment must be de-energized prior to working near them. All extension cords must be kept out of water, protected from crushing, and inspected regularly to ensure structural integrity. Temporary electrical circuits must be protected with ground fault circuit interrupters. Only qualified electricians are authorized to work on electrical circuits. Lockout and tagout procedures may be applicable (See Appendix D).



- High-Pressure Washing--Pressure washing of equipment may require the use of high-pressure washers. These devices can be hazardous if not used properly. Refer to appendix E for specific standard operating procedures for high pressure washer.
- Pumping Equipment--Various pumps and hoses may be used for the removal of water from the excavation area. The handling of pressurized hoses that could rupture and violently release liquid materials onto the workers, can be controlled by inspecting all hose fittings for secure connections. (All OPW [cam lock] fittings must be secured with wire.) Employees must don splash gear including splash shields, when moving or disconnecting pumps and hoses.
- Noise--Some equipment often used may create excessive noise. The effects of noise can include:
 - Workers being startled, annoyed, or distracted,
 - Physical damage to the ear, which may cause pain, or temporary and/or permanent hearing loss,
 - Communication interference that may increase potential hazards due to the inability to warn of danger.

If employees are subjected to noise exceeding an 8-hour TWA sound level of 85 dBA (decibels on the A-weighted scale), feasible administrative or engineering controls must be utilized.

- Confined Spaces--Excavation work for this project should not require personnel to enter confined spaces; however, if the depth of the excavation is four feet or more, the appropriate confined space entry procedure shall be followed, a permit shall be completed, and the regional manager of health and safety shall be consulted.

3.3 ENVIRONMENTAL HAZARDS

The primary environmental hazards to be considered during location-specific work are heat stress and cold stress.

3.3.1 Heat Stress

Heat stress may affect personnel wearing protective clothing in conjunction with high ambient temperatures and solar heat load. Plenty of fluids, rest breaks, and careful attention by supervisors are to be used as control measures. As a minimum, the following precautions must be taken:



- The general topic of heat stress should be the subject of the first training session if ambient temperatures are expected to exceed 70°F in the near future. This presentation should include recognition of heat stress, heat stress prevention, and specifically outline the requirements given in the following paragraphs.
- If ambient temperatures are expected to exceed 70°F during the day, all personnel shall drink 1 pint of water prior to commencing work. At each break, water and electrolyte fluids shall be made available. Each person should drink fluids at the break, consistent with his/her fluid loss, recognizing that his/her level of thirst is not a good indicator of fluid loss.

3.3.2 Heat Stress Monitoring

If ambient temperatures are expected to exceed 70°F all supervisors should ensure that their personnel are briefed on the hazards, symptoms, and treatment of heat related problems.

For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceed 85 degrees Fahrenheit, workers should be monitored as follows, for heat stress after every work period:

- Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by ten minutes (or 33 percent), while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by 33 percent.
- Body temperature should be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33 percent), while the length of the rest period stays the same. However, if the OT exceeds 99.7 degrees Fahrenheit at the beginning of the next period, the following work cycle should be further shortened by 33 percent. OT should be measured again at the end of the rest period to make sure that it has dropped below 99 degrees Fahrenheit.
- Body water loss (BWL) due to sweating should be measured by weighing the worker in the morning and in the evening. The clothing worn should be similar at both weighings. The scale should be accurate to plus or minus 1/4



pound. BWL should not exceed 1.5 percent of the total body weight. If it does, the worker should be instructed to increase his daily intake of fluids. Ideally, body fluids should be maintained at a constant level during the workday. Proper nutrition and consumption of various electrolyte fluids usually provide for the replacement of salts lost in the sweat.

Good hygienic standards must be maintained by frequent changes of clothing and daily showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel. Certain laundry detergents, especially if not completely rinsed out, may cause or aggravate heat related skin disorders.

3.3.3 Cold Stress

Working outside in conditions of low ambient temperature can subject workers to cold stress, which includes frostbite and hypothermia. As a minimum, the following precautions must be taken if ambient temperatures are expected to be below:

- Training sessions are to be regularly held to emphasize warning symptoms such as reduced coordination, drowsiness, impaired judgment, fatigue, and numbing of toes and fingers,
- Workers must be outfitted with winter clothing as necessary,
- Clothing must be changed as soon as it becomes wet,
- Warm shelters and regular rest periods will be available for crew members,
- Warm beverages should be provided.

Additional information pertaining to and standard operating procedures for evaluating heat stress/cold stress are included in Appendix F.



4.0 WORK AREA CONTROL

The purpose of area control is to minimize potential contamination of workers, protect the public from the area activities, and prevent loss due to vandalism.

The excavation areas for this job vary with respect to characterization of work zones, area control and access. The range of locations includes residential areas, public access routes (alleys, etc.) and open fields. The access route to each location varies from alleyways and roads with ample access room to residential driveways with limited access. The exclusion zone and its respective work zones for each separate location will vary with respect to size and area, and should be based upon surveys conducted of each area once crews are on-location.

4.1 DESIGNATION OF WORK ZONES

To prevent both exposure to unprotected personnel and migration of contamination due to tracking by personnel or equipment, work zone areas must be clearly identified.

Work areas or zones should be designated as suggested in "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/USEPA, November 1985. Each of the work areas must be divided into three zones:

- Exclusion zone (dirty or contaminated),
- Contamination reduction zone (CRZ or transition);
- Support zone (clean).

In general, the exclusion zone includes all designated work areas and all areas where chemicals and physical hazards exist. These zones should be marked with caution tape or other suitable means. The exclusion zones for locations included in this project are depicted on maps in Appendix M of this plan. Areas designated as "trace" are considered "hot" areas and will therefore be designated as the exclusion zone.

Location access will occur from the support zone through the contamination reduction zone (CRZ) to the exclusion zone. The CRZ should be a corridor located where the support zone is upwind (for example, if wind is blowing from the north, the CRZ corridor will be north of the location). These zones will be determined once on-location, as wind direction and other environmental factors will be considered in the delineation of the CRZ.

4.2 EXCLUSION ZONE

The exclusion zone will consist of active work areas where chemical and physical hazards exist, or have the potential to exist, during operations. The exclusion zone shall be marked with caution tape. All personnel entering this area must wear the prescribed level of protective equipment. Unauthorized personnel shall not be allowed in this area. Work zones within the



exclusion zone are to be designed once personnel are on-location and should be based upon the location survey. Typically the work zone will span 15-20 feet when feasible. Due to the variation in excavation areas, smaller zones may be encountered.

4.3 CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) will be a clearly marked corridor(s) between the exclusion and support zones; this is where personnel will begin the sequential decontamination process when exiting the exclusion zone. To prevent cross contamination and for accountability purposes, all personnel will enter and leave the exclusion zone through the contamination reduction zone. Appropriate equipment for hygienic activity such as soap, water, and towels, shall be made available in this area. Emergency equipment such as eye wash, first aid kit, and emergency alarm shall be made available in this area. The location and delineation of the CRZ will be contingent on the location of the exclusion zone and conditions of the area, and will therefore be determined upon mobilization to the area(s).

4.4 SUPPORT ZONE

The support zone should be located upwind, if possible and shall be secured against active or passive contamination from the work location. The support zone will consist of those areas adjacent to the exclusion zone where support trailers and equipment are staged. Eating, drinking, and smoking will be allowed only in this area.

4.5 LOCATION MAP

Location maps must be developed showing the location of emergency equipment and work zones and egress routes. These maps must be updated as location conditions change. Refer to Appendix B for review of the location maps.

4.6 LOCATION SECURITY

Location security is necessary to:

- Prevent chemical and physical exposures to unauthorized and/or unprotected people by site hazards;
- Avoid the increased hazards and liabilities from vandals or persons seeking to abandon other wastes on location;
- Prevent theft; and
- Avoid interference with safe working procedures.



To maintain location security during working hours:

- Control points must be maintained to control personnel access to the exclusion and decontamination zone;
- An identification system of some fashion should be established to identify authorized persons; and
- Responsibility for enforcing exclusion zone entry and exit requirements should be assigned.

To maintain site security during off-duty hours:

- Barricade open excavations;
- Secure the equipment; and
- Notify the local police department of site activities.

4.7 THE BUDDY SYSTEM

Activities in contaminated or otherwise hazardous areas should be conducted with a buddy who is able to:

- Maintain sight of his other partner;
- Provide his or her partner with assistance;
- Observe his or her partner for signs of chemical or heat exposure;
- Periodically check the integrity of his or her partner's protective clothing; and
- Notify the site supervisor or others if emergency help is needed.

4.8 WORK AREA COMMUNICATIONS

Two sets of communication systems should be established: internal communication among on-location personnel and external communication between on- and off-location personnel.

Internal communication for this project will consist of Motorola hand-held radios in combination with a stationary base unit. The base station will be located at the NL Industries/Taracorp location, and hand-held radios will be carried by the following personnel:

- OHM site supervisor
- OHM foremen at each location
- EPA representative
- USACE representative
- PCTs at the base location



Extra hand-held radios will be available as back-up units.

Internal communication is used to communicate the following information for this project:

- Alert team members to emergencies;
- Answer questions concerning work operations;
- Communicate changes in the work to be accomplished; and
- Maintain work area control.

Verbal communication on-location can be impeded by area background noise and the use of PPE. All communication devices used in a potentially explosive or flammable atmosphere must be intrinsically safe and not capable of sparking. The internal communication systems used on this project may be hand-held radios and/or voice communication.

An external communication system between on- and off-location personnel is necessary to:

- Coordinate emergency response;
- Report to management; and
- Maintain contact with essential off-location personnel.

The primary means of external communication is by telephone. All personnel must be informed as to the location of the telephone or nearest available telephone.

4.9 COMMUNICATION PROCEDURES

Personnel in the exclusion zone should remain in communication or within sight of other project personnel. Difficulties in maintaining communications requires an evaluation of whether personnel should leave the exclusion zone.

A 30-second blast on the air horn is the emergency signal to indicate that all personnel should leave the exclusion zone and assemble in the contamination reduction zone. Evacuation routes are to be established once personnel are on-location.



5.0 ACCIDENT PREVENTION PROGRAM

A health hazard analysis has been developed in the form of Phase Safety Plans to examine the health and safety hazards inherent within each separate project task. The goal of this exercise is to enable personnel to recognize, evaluate, and control hazards before they develop. This exercise is intended to identify hazards in a task-specific fashion, in addition to the broad identification outlined in Section 3.0. This hazard analysis must be further developed by project supervisory staff while on-location prior to beginning any specific activity and then incorporated into this SSHP on an ongoing basis. The Phase Safety Plans are intended to be used by all site personnel, who are encouraged to discuss and expand upon valuable information about task hazards. Controls are often determined by experienced personnel or by dialogue between thoughtful and interested crew members. Brainstorming sessions can sometimes identify serious hazards that may at other times be overlooked or forgotten about.

For the purposes of hazard analysis, this project can be divided into nine separate tasks as follows:

- Mobilization;
- Installation of perimeter fence;
- Bag and stockpile non-hazardous material;
- Soil sampling;
- Excavation of contaminated soil and/or battery case material;
- Backfill of excavations;
- Soil load-out activities
- Restoration of disturbed areas;
- Decontamination and demobilization.



5.1 PHASE SAFETY PLAN

Job/Phase/Task

Hazards to be Controlled

Action to be Taken to Overcome Hazards

Mobilization

Potential atmospheric hazards

- 1) Implement air monitoring program for detection of lead.**
- 2) Exclusion zone shall be delineated and PPE shall be utilized as necessary.**
- 3) Safety orientation meetings must be held.**
- 4) Implement wet method for dust control during all phases of activity. Unless the area is already wet, the excavation area should be pre-wetted to prevent visible emissions, if visible emissions are observed, work will stop immediately.**

**Potential contact hazards
from chemical agents**

- 1) Visually inspect work area for presence of chemical contamination (lead battery casings.)**

5.1 PHASE SAFETY PLAN

<u>Job/Phase/Task</u>	<u>Hazards to be Controlled</u>	<u>Action to be Taken to Overcome Hazards</u>
Mobilization (continued)	Electrocution	<ol style="list-style-type: none">1) Only qualified electricians shall be allowed to hook-up electrical circuits.2) All extension cords shall be inspected daily for structural integrity, ground continuity, and damaged areas.3) Extension cord inspection should be documented, ground fault circuit interrupters (GFCI) should be used on all 110-120 v circuits.4) Electric wire of flexible cord passing through work area shall be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.5) Plugs and receptacles shall be kept out of water unless of an approved submersible type.6) All electrical circuits shall be grounded in accordance with the NEC and the NESC.

5.1 PHASE SAFETY PLAN

<u>Job/Phase/Task</u>	<u>Hazards to be Controlled</u>	<u>Action to be Taken to Overcome Hazards</u>
Mobilization (continued)	Strains from manually moving materials and equipment	<ol style="list-style-type: none">1) Personnel shall be directed to use proper lifting techniques such as keeping back straight, lifting with legs, limiting twisting, and getting help in moving bulky/heavy materials and equipment.2) Hand truck use shall be encouraged.3) Heavy equipment safety procedures shall be implemented.4) All heavy equipment shall be inspected daily and documented prior to use.
	Slips, trips and falls from various agents	<ol style="list-style-type: none">1) Work areas shall be visually inspected and pre-existing slip, trip, and fall hazards shall be marked, barricaded, or eliminated as is feasible.2) Work areas shall be kept neat and in an orderly state of housekeeping.3) Proper illumination shall be maintained in work areas.

5.2 PHASE SAFETY PLAN

Job/Phase/Task

**Install Perimeter
Fence**

Hazards to be Controlled

Muscle strains/back injuries

Action to be Taken to Overcome Hazards

- 1) Get other personnel to help move the fencing.
- 2) Personnel should recognize that rolled sections of fencing can be very heavy and extremely awkward, and that the use of mechanical equipment to move or position rolls of fencing is recommended.
- 3) If personnel must lift or move fencing components, they should lift with their legs and avoid twisting while lifting.

Slips, trips, and falls

- 1) Personnel shall look for and eliminate any pre-existing hazards.
- 2) Additionally, personnel shall be watching for and addressing any other hazards as they arise.

5.2 PHASE SAFETY PLAN

Job/Phase/Task

**Install Perimeter
Fence (continued)**

Hazards to be Controlled

Cuts on hands

Action to be Taken to Overcome Hazards

- 1) Wear gloves to prevent cutting hands on wire.**
- 2) Be alert to tension build-up on coiled rolls of fence.**

5.3 PHASE SAFETY PLAN

JOB/PHASE/TASK

**Bag and Stockpile
Non-hazardous Material**

HAZARDS TO BE CONTROLLED

**Strains from manually moving
materials and equipment**

ACTION TO BE TAKEN TO OVERCOME HAZARDS

1) Personnel shall use appropriate lifting techniques such as keeping back straight, lifting with legs, limiting twisting, getting help in moving bulky/heavy loads, and using mechanical assistance when feasible.

Equipment hazards

1) Appropriate equipment inspections shall be conducted and documented prior to use.

2) All heavy equipment shall be equipped with Roll-Over Protection Systems (ROPS), back-up alarms, and seat belts.

3) Personnel shall remain outside of the stockpile area.

4) Only trained and qualified personnel shall operate heavy equipment.

5) Prevent operating equipment at excessive speeds or beyond the rated load capacity.

Atmospheric or contact hazards

1) Ambient air monitoring will be conducted during operations.

2) Appropriate PPE levels will be used, based on a location specific evaluations.

**Hazards associated with tool
use**

1) Appropriate tools shall be used for work on this job. Damaged tools shall be taken out of service. Tools shall be inspected on a regular basis.

5.4 PHASE SAFETY PLAN

Job/Phase/Task

Hazards to be Controlled

Action to be Taken to Overcome Hazards

Soil Sampling

**Atmospheric and contact hazards
from chemical and physical agents**

- 1) PPE use shall be required.**
- 2) Ambient air monitoring and visual monitoring for lead shall be used to verify selection of PPE.**
- 3) Prevent potential ingestion by not eating, drinking, smoking, putting hands or other objects near mouth.**

**Injury from use of excavation
and sampling equipment**

- 1) Boring equipment shall be inspected before each use.**
- 2) Personnel shall have been trained in the use of excavation equipment.**
- 3) Personnel shall maintain appropriate work/rest cycles to minimize fatigue.**
- 4) Hydraulic equipment shall be used when possible for inserting and extracting split spoon to prevent back strains.**

5.5 PHASE SAFETY PLAN

<u>Job/Phase/Task</u>	<u>Hazards to be Controlled</u>	<u>Action to be Taken to Overcome Hazards</u>
Excavation of Contaminated Soil and/or Battery Case Material	Atmospheric and contact hazards from chemical agents	<ol style="list-style-type: none">1) PPE use shall be required.2) Ambient air monitoring for lead and visual monitoring for battery casings shall used to verify selection of PPE.3) Dust control must be given high priority.
	Excavation hazards from soil and concrete removal	<ol style="list-style-type: none">1) Personnel shall follow standard operating procedures for excavation safety (see Appendix G.) Confined space entry should not be required for this job as it stands; however, if conditions would require confined space entry at any of the excavation locations, appropriate guidelines should be acquired.
	Strains from use of tools	<ol style="list-style-type: none">1) Personnel shall maintain rational pace when using tools and given adequate rest periods.2) Tools shall be maintained in good condition.3) Select appropriate tool for the job (size, type.)

5.5 PHASE SAFETY PLAN

Job/Phase/Task

**Excavation of
Contaminated Soil
and/or Battery Case
Material (continued)**

Hazards to be Controlled

Heavy equipment hazards

Action to be Taken to Overcome Hazards

- 1) All heavy equipment on this project shall be equipped with Roll-Over Protection Systems (ROPS) and back-up alarms.**
- 2) Personnel shall be cognizant of the boom swing area and stay clear of its path.**
- 3) Heavy equipment shall be inspected daily prior to use.**
- 4) All inspections shall be documented.**
- 5) Follow all specified capacities (speed, load.)**

5.6 PHASE SAFETY PLAN

<u>Job/Phase/Task</u>	<u>Hazards to be Controlled</u>	<u>Action to be Taken to Overcome Hazards</u>
Backfill of Excavations	Excavation hazards	<ol style="list-style-type: none">1) All previously stated safety precautions and OHM standard operating procedures for excavation safety (Appendix G) shall apply.
	Heavy equipment hazards	<ol style="list-style-type: none">1) All heavy equipment on this project shall be equipped with Roll-Over Protection Systems (ROPS), back-up alarms, and seat belts.2) Personnel shall be cognizant of the boom swing area and stay clear of its path. The area should be marked and/or roped off if possible.3) Personnel shall remain outside of backfilling area.4) A warning device or signal person shall be provided where there is danger to persons from moving equipment, swinging loads, buckets, booms etc.5) All heavy equipment shall be inspected and documented daily prior to use.6) Operators shall be qualified to operate heavy equipment.

5.6 PHASE SAFETY PLAN

Job/Phase/Task

**Backfill of
Excavation
(continued)**

Hazards to be Controlled

Excavation hazards

Action to be Taken to Overcome Hazards

- 7) Operators shall observe equipment capacities, including speed, lifting, range, etc.**
- 8) Utilize appropriate PPE (including seatbelt, if required, while operating heavy machinery.)**

5.7 PHASE SAFETY PLAN

<u>Job/Phase/Task</u>	<u>Hazards to be Controlled</u>	<u>Action to be Taken to Overcome Hazards</u>
Soil Load-Out Activities	Truck traffic	1) Truck routes shall be designated.
		2) Personnel shall stay clear of traffic.
		3) Personnel shall be on guard when working in this area.
		4) The use of spotters shall be provided in this area.
		5) No vehicle will be loaded so as to obscure the driver's view ahead or to either side or to interfere with the safe operation of such a vehicle.
		6) The load on every vehicle shall be distributed evenly, checked, and tied down or secured.
		7) Trucks will observe the designated speed limit(s) and will operate the vehicle in a non-wreckless fashion.
	Hazards from atmosphere and physical contact	1) PPE shall be required.
		2) Ambient air monitoring for lead and other metals and visual monitoring for battery casings shall be used to verify selection of PPE.
		3) Dust control shall be maintained.

5.8 PHASE SAFETY PLAN

JOB/PHASE/TASK

Restoration of
Disturbed Areas
(Asphalting and
Sodding)

HAZARDS TO BE CONTROLLED

Slips, trips, and falls

ACTION TO BE TAKEN TO OVERCOME HAZARDS

- 1) Work areas shall continue to be visually inspected and slip, trip, and fall hazards shall be marked, barricaded or eliminated as is feasible.
- 2) Areas shall be kept neat and in an orderly state.
- 3) Proper illumination shall be maintained in work areas.

Strains from moving
equipment

- 1) Personnel shall be directed to use proper lifting techniques such as keeping back straight, lifting with legs, limiting twisting back, getting help in moving bulky/heavy loads, and using mechanical equipment to move materials and equipment.
- 2) Hand truck use shall be encouraged.

Noise Protection

- 1) Proper hearing protection will be provided.

5.8 PHASE SAFETY PLAN

JOB/PHASE/TASK

**Restoration of
Disturbed Areas
(Asphalting and
Sodding continued)**

HAZARDS TO BE CONTROLLED

Electrocution

ACTION TO BE TAKEN TO OVERCOME HAZARDS

- 1) Electricians shall inspect work area to identify electrical circuits.**
- 2) Only qualified electricians shall be allowed to hook-up electrical circuits.**
- 3) All extension cords shall be inspected daily for structural integrity, ground continuity, and damaged areas.**
- 4) Prevent contact of electrical extension cords with standing water.**
- 5) Utilize a ground fault circuit interruptor (GFCI) on all extension circuits.**

Heavy equipment

- 1) Heavy equipment shall be equipped with ROPS and back-up alarms.**
- 2) Personnel shall be "on-guard" when working in the vicinity of heavy equipment.**

5.9 PHASE SAFETY PLAN

Job/Phase/Task

**Decontamination and
Demobilization**

Hazards to be Controlled

**Potential atmospheric
and contact hazards from
chemical agents**

Action to be Taken to Overcome Hazards

- 1) All equipment will be decontaminated prior to being removed from the area.**
- 2) PPE shall be used as required.**
- 3) All general chemical hazards in the area and decontamination solution must be stored in the appropriate containers in the designated areas.**
- 4) Ambient air monitoring for lead and other chemicals used on-location and visual monitoring shall be used to verify selection of PPE.**

High pressure washer hazards

- 1) Standard operating procedures for high pressure washer safety must be followed (see Appendix E.)**

**Strains from use of tools
such as shovels and scrapers**

- 1) Personnel shall maintain a rational pace when using tools and given an adequate rest period.**
- 2) Tools shall be appropriate for the task and maintained in good condition.**

5.9 PHASE SAFETY PLAN

<u>Job/Phase/Task</u>	<u>Hazards to be Controlled</u>	<u>Action to be Taken to Overcome Hazards</u>
Decontamination and Demobilization (continued)	Strains from manually moving materials and equipment	<ol style="list-style-type: none">1) Personnel shall be directed to use proper lifting techniques such as keeping back straight, lifting with legs, limiting twisting, getting help in moving bulky/heavy loads, and using mechanical equipment to move material and equipment.2) Hand truck use shall be encouraged.3) Personnel shall work at a rational pace.
	Slips, trips, and falls	<ol style="list-style-type: none">1) Work area shall continue to be visually inspected and slip, trip, and fall hazards shall be marked, barricaded, or eliminated as is feasible.2) Work area shall be kept neat and in an orderly state.3) Proper illumination shall be maintained in work areas.
	Electrocution	<ol style="list-style-type: none">1) Only qualified electricians shall be allowed to disconnect electrical circuits.2) All extension cords shall continue to be inspected daily for structural integrity, ground continuity, and damaged areas.

5.9 PHASE SAFETY PLAN

<u>Job/Phase/Task</u>	<u>Hazards to be Controlled</u>	<u>Action to be Taken to Overcome Hazards</u>
Decontamination and Demobilization (continued)	Electrocution	3) Ground fault circuits shall be used on all 110-120-v circuits. 4) The safety actions specified in Section 5.1 also apply.

6.0 PERSONNEL PROTECTIVE EQUIPMENT

Work on location will be accomplished primarily using tow levels of protection, USEPA Levels D and C/ The following supplemental protective clothing/equipment should be utilized as necessary to help control for cold stress on location:

- ▶ Cotton work gloves\
- ▶ Insulated coveralls
- ▶ Hard hat liners
- ▶ Tyvek coveralls

The following text summarized the levels of protection in detail.

6.1 LEVEL D - NO RESPIRATORY PROTECTION

Work in the support zone may be done in Level D PPE depending on results of initial and ongoing air monitoring.

Level D equipment consists at a minimum, of:

- ▶ Eye protection (safety glasses with sides, shields or goggles)
- ▶ Hard hats
- ▶ Safety shoes or boots (Steel toe/shank)

6.2 LEVEL C - FULL-FACE AIR PURIFYING RESPIRATORS

Some work in the exclusion zone, and where there is the potential for exposure to airborne contaminants, (especially during debris removal and excavation work) will require the use of Level C PPE. Level C equipment consists of:

- ▶ MSA "Ultra-twin" full-face respirator with BMC-H cartridges (provides protection against organic vapors, chlorine, hydrogen chloride, sulfur dioxide, dusts, fumes, mists, radon daughters, asbestos-containing dusts and mists, pesticides, and radionuclides.) Survivair 4200 equipped with 1093 cartridge and American Optical full-face "Commander" or "Seven Star" equipped with R53HE cartridges are acceptable equivalents.
- ▶ Hard hat (face shield for high-pressure washing)
- ▶ Cotton coveralls (inner, hot work)
- ▶ Regular Tyvek coveralls with hood (dry materials work)
- ▶ Saranex-coated Tyvek coveralls with hood (wet materials)
- ▶ Leather, steel-toed and shank work shoes/boots
- ▶ PVC Robar or Neoprene Tingley outerboots over vinyl latex booties (for operations workers)



- ▶ Vinyl or latex inner gloves
- ▶ Cotton gloves (inner, as desired)
- ▶ PVC or Nitrile gloves (outer)
- ▶ Rain suits (required for high-pressure washing)
- ▶ Hearing protection (if necessary)

All joints between protective garments will be sealed with vinyl duct tape.

6.3 TASK-SPECIFIC PROTECTION LEVEL

Based on the evaluation of potential hazards, the following levels of PPE have been designated for the applicable work areas or tasks:

TASK	INITIAL LEVEL OF PROTECTION
Mobilization	Level D
Installation of perimeter fence	Level D
Bag and stockpile non-hazardous materials	Level C or D
Soil sampling	Level D
Excavation of contaminated soil	Level C
Load-out of contaminated soil	Level C
Backfill of excavation	Level D
Restoration of disturbed areas	Level D
Decontamination and demobilization	Level C or D

NOTE: Levels of protection may be upgraded or downgraded depending on air monitoring results and actual field conditions. All changes in the protection level must be approved by the Regional Manager of Health and Safety and the USACE on-location representative.



7.0 DECONTAMINATION PROCEDURES

Decontamination is accomplished to ensure the materials that personnel and equipment may have contacted in the exclusion zone are removed in the contamination reduction zone before passing into the support zone.

Decontamination areas will be located in the contamination reduction zone, which will vary from each location as determinations of exclusion zones are made. The decontamination area(s) will begin at the perimeter of the exclusion zone and end at the entrance to the support zone.

7.1 PERSONNEL DECONTAMINATION PROCEDURES - LEVELS C

- ▶ Deposit any equipment used on-location in a segregated area prior to entering the contamination reduction zone. This segregation reduces the possibility of cross contamination.
- ▶ At the perimeter of the exclusion zone, rain gear or splash protection (if worn) should be damp-wiped or wet sprayed to remove any adhered particles. The effort will eliminate any exposure to support personnel and workers themselves during the PPE removal process (doffing).
- ▶ Robar/Tingley boots are to be scrubbed with a detergent-water solution. The boots will then be removed and placed on a rack for drying.
- ▶ Hard hats are to be removed and hung up. On a daily basis, these are to be scrubbed with a detergent-water solution.
- ▶ Outer gloves are to be cleaned and removed, and depending on condition, may be disposed in the solid wastestream (if damaged or uncleanable).
- ▶ Splash gear is to be removed, cleaned, and hung up to dry (if worn).
- ▶ Tyvek suits are to be removed and disposed of in the solid wastestream.
- ▶ Respirators are to be removed and prepared for reuse or decontaminated.
- ▶ Vinyl booties are to be removed and disposed of in the solid wastestream.
- ▶ Sample gloves are to be removed and disposed of in the solid wastestream.
- ▶ Each person is to wash his or her hands, arms, neck, and face.

7.2 SUSPECTED CONTAMINATION

Any employee suspected of experiencing skin contact with contaminated materials is to remove all clothing, shower, and don clean clothes. Following this, he/she must report to the site supervisor and/or HSO.



7.3 PERSONAL HYGIENE

Before eating, smoking, or drinking, personnel must wash hands, arms, neck, and face. Personnel may be required to shower before leaving the project area at the end of each day's activity. Personnel not required to shower on-location should do so immediately upon arrival to the motel at the end of the work shift.

7.4 EQUIPMENT DECONTAMINATION

Any equipment, vehicles, or tools that have entered an exclusion zone must be cleaned prior to removal. Some equipment decontamination may require pressurized water or steam cleaning. All water and material must be collected and placed in the designated waste disposal area. All diaphragm pumps, if used, are to be disassembled and cleaned thoroughly. These pump components may be sent to Findlay, Ohio, disassembled after having been cleaned; however, they should be collected for shipping as one parcel.

Following this cleaning, all items are to be inspected and approved by the site supervisor prior to removal from the area.

7.5 OTHER DECONTAMINATION PROCEDURES

7.5.1 General

All liquids and disposable clothing are to be treated as contaminated waste and disposed of properly. Personnel handling contaminated waste must wear Level C protection. Equipment must be cleaned prior to demobilization. Washwaters and residues must be collected for treatment and/or proper disposal.

7.5.2 Pumps (If Required)

- ▶ Don appropriate PPE
- ▶ Drain Pump
- ▶ Pump decontamination solution through pump (surfactant/water solution)
- ▶ Wash outside of pump
- ▶ Disassemble pump and wipe down internal surfaces
- ▶ Soak all pump components (including hardware) in decontamination solution
- ▶ Rinse and dry
- ▶ Securely package pump and/or parts for shipment to OHM in Findlay, Ohio
- ▶ Contact resource manager to report equipment status and for dispatch

7.5.3 Cleaning 2-Inch and 3-Inch Submersible Pumps

- ▶ If pump is operational:
 - Don appropriate PPE



- Recirculate a sufficient quantity of cleaning solution through pump
 - Recirculate rinsewater through pump
 - Wash down outside of pump and wipe off electrical cord
 - Tag for status
- ▶ If pump is not operational:
- Don appropriate PPE
 - Remove four bolts from bottom of pump and remove casing
 - Wipe down inner surfaces and clean impeller
 - Pour cleaning solution down through top; discharge OPW fitting
 - Reassemble impeller and bottom casing
 - Washing down outside of pump and wipe off electrical cord
 - Tag for status

7.5.4 Vehicles and Heavy Equipment (Yellow Iron)

- ▶ Scrape or brush off gross residues
- ▶ Pressure wash outside of equipment paying particular attention to tires and tracks.
- ▶ Vacuum (HEPA) and wipe down interior
- ▶ Clean windows with "Windex" and paper towels
- ▶ Remove belly pan (Yellow Iron)
- ▶ Dispose of residues and clean surfaces (Yellow Iron)
- ▶ Return assembled if possible; if not, then return unassembled to Findlay, Ohio (Yellow Iron)
- ▶ Contact resource manager to report equipment status and for dispatch

7.6 SAMPLING EQUIPMENT

All sampling equipment utilized should be disposable, stainless steel, or Teflon. All non-disposable sampling equipment used in obtaining samples should be cleaned or decontaminated by the following procedures:

- ▶ Scrape off soils with putty knife
- ▶ Wash with Alconox solution to remove all large particles
- ▶ Rinse with tap water
- ▶ Rinse with 1:1 isopropanol
- ▶ Rinse with double de-ionized water rinse
- ▶ Air dry



7.6.1 Sample Containers

Sample containers will be pre-cleaned to USEPA cleaning protocols as follows:

Protocol A

- ▶ Wash bottles, caps, and liners in laboratory grade, non-phosphate detergent
- ▶ Rinse three times with distilled water
- ▶ Rinse with 1:1 nitric acid (eye protection must be used and eye wash must be available nearby)
- ▶ Rinse three times with ASTM, Type 1, organic-free water
- ▶ Oven-dry for 1 hour
- ▶ Rinse with hexane (limit ignition sources, have fire extinguisher nearby, and provide ventilation)
- ▶ Oven-dry for 1 hour

Protocol B

- ▶ Wash vials, septa, and caps in laboratory grade, non-phosphate detergent
- ▶ Rinse three times in distilled water
- ▶ Rinse three times with ASTM, Type 1, organic-free water
- ▶ Oven dry for 1 hour

Protocol C

- ▶ Wash bottles, caps, and liners in laboratory grade, non-phosphate detergent
- ▶ Rinse three times with distilled water
- ▶ Rinse with 1:1 nitric acid (eye protection must be used and eye wash must be available nearby)
- ▶ Rinse three times with ASTM, Type 1, organic-free water
- ▶ Air dry

7.7 DECONTAMINATION WASTES GENERATED

All liquid wastes generated during decontamination procedures (i.e., aqueous and nonflammable organic solvent rinses) must be collected and temporarily stored at the soil staging areas. Personnel must recognize the need for generation of these wastestreams to be kept at a minimum throughout the project. Solid wastes shall be drummed or incorporated into other solid wastestreams for proper disposal.



7.7.1 Collection Procedures of Decontamination Wastes

All solid wastes must be collected in garbage bags and placed in 55-gallon drums (or other container as specified by disposal firm) for eventual disposal.

The liquid wastes must be collected in drums and temporarily staged in the soil staging areas. For personnel decontamination, the rinsate is to be contained in the boot and glove wash/rinse stations and then collected in drums for addition (to be staged) into the soil staging areas. For equipment decontamination, the rinsate is to be collected at the decontamination pad sumps and collected in drums for temporary staging in the soil staging areas. Treatment and disposal for these materials must be performed in a manner suitable with the compliance of RCRA 90 day disposal period.

7.8 EMERGENCY DECONTAMINATION

In addition to routine decontamination procedures, emergency decontamination procedures must be established. In an emergency, the primary concern is to prevent the loss of life or severe injury to location personnel. If immediate medical treatment is required to save a life, decontamination should be delayed until the victim is stabilized. If decontamination can be performed without interfering with essential life-saving techniques or first aid, or if a worker has been exposed to corrosive material, decontamination must be performed immediately. If an emergency due to a heat-related illness develops, protective clothing should be removed from the victim as soon as possible to reduce the heat stress. During an emergency, provisions must also be made for protecting rescue, first aid, or medical personnel from hazardous materials and for disposing of contaminated clothing and equipment.

- ▶ If decontamination can be done:
 - Wash, rinse, and/or cut off protective clothing and equipment.
- ▶ If decontamination cannot be done:
 - Wrap the victim in blankets or plastic to reduce contamination of other personnel.
 - Alert emergency and off-location medical personnel to potential contamination; instruct them about specific decontamination procedures if necessary.
 - Send along site personnel familiar with the incident.



7.8.1 Emergency Decontamination Equipment

The following equipment shall be readily available for emergency decontamination:

- ▶ Tyvek coveralls
- ▶ Nitrile gloves
- ▶ Soap and water
- ▶ Visqueen
- ▶ Towels
- ▶ Eyewash station
- ▶ Spare coveralls



8.0 RESPIRATORY PROTECTION

Respiratory protection is required to protect personnel from inhalation hazards during certain project operations.

8.1 AIR-PURIFYING RESPIRATORS

Air-purifying respirators for this project will be MSA "Ultra-twin" full-face equipped with GMC-H cartridges.* The GMC-H cartridge provides protection against organic vapors, chlorine, hydrogen chloride, sulfur dioxide, dusts, fumes, mists, radon daughters, asbestos-containing dust and mists, and radionuclides.

* Survivair 4200 equipped with 1093 cartridge and American Optical full-face "Commander" or "Seven Star" equipped with R53HE, and MSAGMA-H are also acceptable equivalents; however, these cartridges do not carry a NIOSH approval for acid gases and pesticides.

8.2 CARTRIDGE CHANGES

All cartridges are to be changed at a minimum of once daily; however, dusty or wet conditions may necessitate more frequent changes. Personnel are to change cartridges if breakthrough odors are detected or if resistance to breathing is substantially increased.

8.3 INSPECTION AND CLEANING

Respirators are to be checked weekly by the site supervisor or HSO and before each use by the wearer. All respirators and associated equipment must be decontaminated and hygienically cleaned daily. Respirators must be stored in sealed bags or lockers at the conclusion of each day's activity.

8.4 FACIAL HAIR

No worker who has facial hair that interferes with the respirator's sealing surface will be permitted to wear a respirator or work in the exclusion zone.

8.5 FIT TESTING

All workers have been fit tested with either isoamyl acetate or irritant smoke. Each time a worker dons a respirator, it is that worker's responsibility to perform a negative and positive pressure fit test. A quantitative fit test will be also performed every 6 months to comply with the new Lead in Construction Standard, 29 CFR 1926.62(f)(3)(ii).



8.6 CORRECTIVE LENSES

Normal eyeglasses may not be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided. Contact lenses shall not be worn with any type of respirator.



9.0 ENVIRONMENTAL MONITORING

The purpose of air monitoring at this project is to measure and /or quantitate emissions/exposures both within the work areas and at the perimeter of the area. Specifically, the intent of air monitoring during this project is to:

- ▶ Ensure the safety of on-location personnel
 - Personnel who are most likely to be exposed to lead will be monitored to ensure compliance with 29 CFR 1910.1025. (For example, tow workers in the area and the backhoe operator.)
- ▶ Ensure the safety of people who are not on-location; but who are in the downwind vicinity of the area.
 - Samples are to be taken at the perimeter of each excavation area.
 - All visible emissions of dust must be suppressed.

The following monitoring plan applies to each individual excavation location involved in this project. Separate air monitoring must be conducted and the results are to be evaluated for each individual location.

The analyte of concern at this project is lead; however, generic dust concentrations shall also be monitored. If dust concentrations in the ambient air cannot be effectively suppressed, the dust control procedures shall be re-evaluated until visible dusts are adequately suppressed.

Unless already wet, excavation areas must be pre-wetted to prevent visible dust emissions. If visible dust emissions can be seen emanating from the excavation location(s), the emissions control procedures shall consist of suppression by spraying a water mist into the air until dust has settled and cannot be seen visually.

9.1 AIR MONITORING METHODOLOGIES

Both time integrated sampling and real-time monitoring shall be used to characterize the ambient air at the project locations.

9.1.1 Time Integrated Sample Collection

The air sampling method (NIOSH Method 7082) for lead shall be used and requires the use of personal air sampling pumps fitted with 37 mm MCE filter cassettes. The result of this sampling is averaged over time for comparison with the OSHA-PEL.



9.2 EQUIPMENT REQUIREMENTS

The following sections identify the equipment that is necessary for air monitoring at and during this project.

9.2.1 Personal Air Sampling Pumps

These instruments are precision air pumps that can be set at a desired flow rate to capture air samples on an attached collection device. When used to collect air samples over a long period of time, large volumes of air can be obtained to detect various chemicals at lower concentrations than real-time instrumentation. Air sampling pumps are also useful for time-integrated sampling and expression of results as TWA. The analytical results are often more analyte specific than with real-time monitoring. These pumps are to be used for quantitating the concentrations of lead in the ambient air to monitor personnel exposures and fugitive emissions.

Perimeter pumps are to be installed above ground level to prevent contamination due to foot traffic and normal wind-soil movement. Personal samples are to be collected in the breathing zone of personnel.

9.2.2 Real Time Aerosol Monitoring (Mini-Ram)

This instrument measures the amount of generic aerosols (dusts, mists, fumes, particulates, etc.), in the ambient atmosphere and displays a concentration in mg/m^3 . This instrument can supplement visual observations to determine if dust control is needed or is effective.

9.2.3 Calibration Equipment

Each instrument/device must be calibrated or performance tested prior to and after use. For the real-time instrumentation, the manufacturer's recommended equipment and instructions shall be used. For flow calibration of the personal air sampling pumps, a primary standard such as bubble meter or Mini-Buck calibrator is to be used. A copy of the manufacturer's instrument instructions for use and calibration should be available on-location.

9.3 DURATION OF ENTIRE AIR MONITORING PROGRAM

As discussed previously, due to the changing conditions of the area as removal continues, the air monitoring program will be re-evaluated at least weekly. In general, the location air monitoring must be in effect before groundbreaking and until the excavation of contaminated soil is finished at each location.



9.4 POSTING OF AIR MONITORING RESULTS

All personal air monitoring results will be posted in the break area and the on-location office trailer. Results of air sampling of high volume lead monitoring will be posted in the Granite City Public Library. Analytical results for lead generally require 2-3 days to obtain. Because of the stringent dust control efforts, faster turnaround times should not be necessary. If analytical results are needed more expeditiously in response to increased dust levels, arrangements are to be made with the lab.

9.5 FUGITIVE DUST EMISSIONS

In order to maintain environmental air quality, excavation areas will be pre-wetted to prevent visible emissions of fugitive dust. If visible emissions are observed in the work area, work will shall cease until dust is suppressed.

9.6 X-RAY FLUORESCENT MONITORING

The XRF method will be utilized throughout site operations at this project, (excavation areas, etc.) to determine the presence of lead in the soil/ash.

This method uses X-radiation to excite the sample atoms and then determines the identity and quantity of material(s) present. The following health and safety precautions shall be followed during all XRF sampling:

- ▶ Become familiar with the instrument before use.
- ▶ Do not initiate sample analysis unless probe is connected and sample is in place.
- ▶ Do not remove or adjust samples while the instrument is conducting analysis.
- ▶ Avoid contact with the top of the probe.
- ▶ Never aim the probe at any person, including the user himself/herself.
- ▶ Perform necessary repairs immediately when feasible. Serious repairs should be performed by the instrument's manufacturer or other qualified source.



9.7 AIR MONITORING ACTION LEVELS

Table 9.1 describes the air monitoring action levels:

TABLE 9.1 AIR MONITORING ACTION LEVELS		
Monitoring Device or Analyte	Action Level	Action
Visual	Visible emissions emanating from the excavation perimeter	Stop work; suppress dust emissions; proceed with caution.
Mini-Ram	¹ Eagle Park Acres AL= .365 mg/m ³ ² Cleveland Avenue AL= .5 mg/m ³ ² Colgate AL= .5 mg/m ³ ² Delmar AL= .5 mg/m ³ ² Sand Road AL= .5 mg/m ³	Initiate dust control. Adjust operations (wet the soil) to minimize dust generation. Stop work; increase dust control measures and ensure respiratory protection is adequate.

¹Action level is based on 50 percent of the PEL for lead concentration and samples taken on-location. The sample results are presented in Appendix K.

²Action level is based on 10 percent of the respirable fraction of particulates (dust) not otherwise regulated.

Note: OHM is not aware of the formula used for calculating the individual action levels specified for the mini-ram. The numbers were directed by the USACE under previous contract.



9.8 AIR MONITORING FREQUENCY

Table 9.2 documents the monitoring instruments which will be used on-location at the specified intervals.

TABLE 9.2 AIR MONITORING FREQUENCY	
INSTRUMENT	FREQUENCY OF USE
Time Integrated Sampling (personal sampling pumps)	Samples shall be taken daily during excavation activities using employee worn air pumps with MCE filter cassettes. Samples are to be collected at each location in sufficient numbers to determine if the employees who are most likely to be exposed to chemicals above exposure limits are sufficiently protected. One employee from each job category should be sampled at each location and at least two employees should be sampled daily. Activities in which contaminated soil is not disturbed, do not require personnel monitoring. Four high volume samples should be collected daily or more often, as necessary, during excavation at each location: one in each direction (north, south, east, west) at the perimeter of each excavation location. Perimeter sampling will begin before breaking ground and will continue until all excavation at each location is completed. High volume monitoring is not required during backfill of material determined to be uncontaminated.
MINI-RAM	Monitor perimeter of excavation location intermittently during optimum working hours.



10.0 GENERAL SAFETY

This section outlines general safety topics not addressed elsewhere in this plan.

10.1 SAFETY INSPECTION CHECK-OFF SHEET

The site supervisor, assisted by the HSO is to make a weekly inspection of the site using OHM's Safety Inspection Project Site Form (see Exhibit X). The site supervisor must then ensure that all unsafe conditions found during this inspection are corrected.

10.2 SAFETY RE-EVALUATION

As conditions change, the site supervisor may institute more or less stringent procedures than those outlined in this plan. Any reduction of safety will be implemented only after consultation with the Regional Health and Safety Manager and approval by the USACE on-site representative.

10.3 PARKING

Parking will be permitted only in designated areas as specified by the USACE on-site representative.

10.4 ACCIDENT INVESTIGATION

All accidents or incidents will be reported and investigated as appropriate in accordance with OHM established procedures (see Exhibit XI).

10.5 ILLUMINATION

Areas accessible to employees shall be adequately lighted to intensities as specified in 29 CFR 1926.65(m) Table H-120.1 while any work is in progress.

10.6 SANITATION

Sanitation requirements pertaining to potable water, nonpotable water, toilet facilities, food handling, temporary sleeping quarters, washing facilities, and shower/ change rooms, as specified in 29 CFR 1926.65 (n) must be adequately addressed.

10.7 SAFETY AND HEALTH POSTER

Federal OSHA requires that Health and Safety Poster #2203 be displayed at all times. This poster is to be located in the project office trailer, where employees can be given opportunity to review it. A poster is included as Exhibit XII of this plan.



10.8 SAFETY EQUIPMENT

The safety equipment for this project is to be located in the decontamination trailer in the contamination reduction zone. Some safety equipment will need to be stationed in other areas for easier access. These determinations are to be made once personnel is on-location. See Appendix L for a list of safety equipment available for this project.

10.9 COMPLIANCE WITH 29 CFR 1926.65

The OSHA regulations, "Hazardous Waste Operations and Emergency Response," must be fully complied with. All site personnel are encouraged to read this regulation. Deficiencies in compliance with the contents of this regulation should be brought to the attention of the site supervisor, HSO, or the OHM Midwest Region Health and Safety Manager. All deficiencies must be addressed immediately.



11.0 TRAINING PROGRAM

Training is required by federal law to be given to all personnel that work at this project location. Training is also fundamental for personnel to become proficient in techniques that enhance personal safety, work productivity, and project quality.

11.1 OHM EMPLOYEES

All OHM employees are to have received a 40-hour training session or will have been qualified by experience as required by 29 CFR 1910.120(e), [same as 29 CFR 1926.65(e)], "Hazardous Waste Operations and Emergency Response" and SARA Regulations prior to performing any work at this project site. Site supervisors receive an additional 8 hours of training and all personnel are to attend an 8-hour annual refresher training course.

11.2 EMPLOYEE TRAINING

Employee training covers:

- ▶ Review of 29 CFR 1926.65
- ▶ Hazard communication program
- ▶ Physical, chemical, toxic properties of hazardous materials
- ▶ Decontamination procedures
- ▶ PPE--donning, hazards, risks
- ▶ Respiratory protection
- ▶ Hearing conservation
- ▶ Hazardous substance spill response
- ▶ Confined space entry
- ▶ Excavation safety
- ▶ UST procedures
- ▶ Waste generation, storage, treatment, and disposal
- ▶ OSHA compliance/compliance with regulations
- ▶ Emergency event planning
- ▶ Shock sensitive and explosive materials
- ▶ Heat stress, cold stress
- ▶ Medical surveillance
- ▶ Heavy equipment/hand tool safety

11.3 JOB SITE TRAINING

Before commencing this project, a training session will be held to cover project-related topics. For this particular project topics would include, but are not limited to the following:

- ▶ History of the site(s)



- ▶ Names of personnel and alternates responsible for safety and health
- ▶ Chemicals used or found on site and their hazards (signs and symptoms of exposure)
- ▶ Physical hazards involved with the site operations
- ▶ Site control
- ▶ Work zones--locations of exclusion, contamination reduction, and support zones
- ▶ Heavy vehicles
- ▶ Passenger vehicle safety
- ▶ Levels of protection--C or D
- ▶ Decontamination procedures
- ▶ High-pressure washer safety procedures
- ▶ Excavation safety
- ▶ Using hand tools
- ▶ Emergency procedures, signals, and equipment
- ▶ Electrical and lighting safety
- ▶ Medical surveillance requirements
- ▶ Work area rules

11.4 DAILY SAFETY MEETINGS

A safety meeting is to be held daily before work commences. The scope of work for the day, hazards of the work, hazards of the materials, use of respirators, decontamination, and hazardous areas of the project will be discussed. Periodically, general subjects such as electrical safety, defensive driving, and heat/cold stress should be discussed.



11.5 RECORDS

All training sessions, topics, attendance, training officer, and date of training is to be recorded in a safety training logbook. This logbook shall remain at the work location until completion of the project.

11.6 PRE-PHASE TRAINING

Before a new phase of work is begun in an area with which the crews are not familiar, a training session is to be held covering the chemical and physical hazards related to this particular phase/area.



12.0 MEDICAL SURVEILLANCE

The OHM Medical Surveillance Program is established to ensure that the health of employees is not compromised by potential exposure to chemical or physical agents found at work locations.

12.1 GENERAL

All OHM field personnel and/or subcontractors working on an OHM project must participate in a stringent medical monitoring program as directed in 29 CFR 1926.65(f). The physical, repeated annually, qualifies personnel to work around potentially hazardous substances and safely wear respiratory protection. This physical examination consists of the following:

- ▶ Occupational and medical history
- ▶ Physical examination
- ▶ Visual test
- ▶ Audiometric test
- ▶ Urinalysis
- ▶ Blood test
- ▶ Chest x-ray
- ▶ Pulmonary functions test
- ▶ EKG or EKG stress test (as required)
- ▶ Written report

12.2 PROJECT-SPECIFIC MEDICAL SURVEILLANCE

As required by 29 CFR 1910.1025, blood lead levels must be determined and monitored for personnel working in the affected area prior to the start of work. Blood lead levels should also be determined for affected personnel at the conclusion of the project.

If signs or symptoms of lead exposure develop in any employee, the HSO or site supervisor should be immediately notified. The employee should then be taken directly to a medical center for a complete physical examination and receive treatment for the potential exposure.

Also, if an employee is exposed during an emergency incident to hazardous substances at concentrations above the permissible exposure limits without the necessary protective equipment, he/she must have a medical examination following the incident.

12.3 ANNUAL MEDICAL EXAMINATION

Annual examinations include an updated medical history, including any occupational exposure from the previous year, and a detailed physical examination featuring the same components as the pre-employment examination. The physician pays particular attention when



comparing the biochemical parameters to help ensure no recognized symptoms of toxic exposure have developed during the past year. The physician completes and signs the medical certification/rejection section. A written report of the occupational and medical history, physical examination, and all laboratory work is required.

12.4 EXIT MEDICAL EXAMINATION

An exit medical examination is required for termination of employment or reassignment to an area where the employee would not be covered if the employee has not had an examination within the last 3 months. A written report of the occupational and medical history, physical examination, and all laboratory work is required.

12.5 SUBCONTRACTORS

If a subcontractor is hired in any phase of the project, the company is also required to abide by 29 CFR 1926.65(f) Medical Surveillance Program and OHM policy. Employees of the subcontractor must have a pre-employment physical examination or an examination within the last 12 months to be eligible to work on site.

12.6 ACCESS TO MEDICAL RECORDS

Employees have the right to review personal medical records collected as a result of this surveillance program. A copy of these records will be provided within 15 days of request. Please direct requests to Mark Harber, R.N., located in the Corporate Health and Safety Department (Findlay, Ohio).



13.0 EMERGENCY PROCEDURES

Written standard operating procedures are developed for emergency events. These procedures detail appropriate actions for fire, medical, and personnel exposure events. The following subsections detail specific emergency guidelines and information for this project. OHM will provide its own emergency response when feasible. Emergencies that exceed the capabilities of OHM personnel and equipment will require additional support from agencies designated below.

13.1 EMERGENCY TELEPHONE NUMBERS

The following emergency telephone numbers shall be prominently posted near each telephone:

• Ambulance Service	913-239-7835
• Police Granite City Venice	618-877-6111 618-877-2114
• Fire	618-452-4200
• Hospital St. Elizabeth	618-798-3000
• Chemical--Oil Spills Cleanup (National Response Center)	800-424-8802 202-462-2657
• Chemtrec	800-424-9300
• Center for Disease Control	404-488-4100 (24 hour)
• Poison Control (Omaha, Nebraska)	800-642-9999

13.2 EMERGENCY MAP

A map showing the route to the hospital will be posted near the telephone on site. The written description of the route including actual distance and travel time will be determined upon mobilization to the site.



13.3 EMERGENCY EQUIPMENT

In each operative decontamination area, an emergency equipment station will be set up and will consist of an eyewash station, a first-aid kit (which meets the requirements of 29 CFR 1926.50), emergency alarm (signal), fire blanket, and two 20-pound ABC fire extinguishers. The eyewash units will be located near the source of potential hazard. Each station will be prominently marked.

13.4 EMERGENCY SIGNALS/EMERGENCY ALARMS

The emergency signal consists of intermittent 5 second blasts (medical) or a continuous 30-second blast (fire) on a hand-held air horn. Horns will be located at the outer perimeter of the contamination reduction zone. In the event of an emergency and the horn sounds, operations will be shut down and all personnel will assemble in the contamination reduction zone, be accounted for, and given directions on how to proceed by the site supervisor or, in his absence, by the HSO. If an obvious catastrophic emergency warrants rapid egress from all areas, personnel shall exit the areas and assemble in a designated zone upwind of the emergency. This system is a requirement of OHM policy for all locations and it should be reviewed at least weekly in a daily safety meeting.

13.5 EMERGENCY RESPONSE CONTINGENCY PLAN

When either intermittent 5 second blasts (medical) or a continuous 30-second blast (fire) is sounded, all personnel should evacuate the exclusion zone and proceed to the CRZ quickly. These blasts can be carried out on a hand-held air horn located at the outer perimeter of the CRZ.

13.5.1 Emergency Routes

In an emergency, all personnel will exit through CRZ corridor and assemble in CRZ, upwind, if possible, from the exclusion zone. In an obvious catastrophic emergency, personnel should exit the exclusion zone at nearest exit and assemble in an area designated by the site supervisor upwind of the emergency.

13.6 "BUDDY" SYSTEM

All work in the exclusion zone that involves handling hazardous materials or is otherwise hazardous is to be done using the "buddy" system. Prior to entering the exclusion zone, buddies are to be assigned. Buddies are responsible for ensuring the safety of their respective buddies and should be aware of the potential for exposure to materials found on site and general hazards of the workplace. Buddies shall remain within visual sight of each other at all times.



13.7 EMERGENCY COORDINATOR

The designated emergency coordinator will be the site supervisor. In his/her absence the duties would be assumed by the HSO. If the HSO is not present, then the duty falls to the general foreman.

The duties of the emergency coordinator are as follows:

- ▶ Initially alert emergency service agencies such as fire and police departments and ambulance services that site operations are occurring, nature of project, site orientation, descriptions of PPE, and possible site events that may require their intervention. These agencies should be contacted once OHM personnel arrive on site.
- ▶ Review emergency procedures with all site personnel. This will include the initial site orientation and a review once weekly during site-safety meetings.
- ▶ Ensure that emergency contingency plans remain up to date. As site conditions change, these plans may need to be altered. As the contingency plans change, updates to emergency service agencies may be required.
- ▶ Establish predetermined evacuation areas (upwind as necessary).
- ▶ Coordinate emergency response procedures as required.
- ▶ Ensure that practice runs are conducted along emergency routes periodically.

13.8 MEDICAL EMERGENCY AND PERSONAL INJURY

In any life-threatening situation, the safety of the individual takes precedence over all procedures designed for protection against chemical contamination on site. When the site supervisor is unavailable, the HSO shall assume the emergency coordinator role. At least two OHM personnel certified in first aid/CPR will be on site during work operations.

13.8.1 Worker Procedure

The first worker who notices that a medical emergency or personal injury has occurred shall immediately make a subjective decision as to whether the emergency is life-threatening and/or otherwise serious.



13.8.2. Life-Threatening and/or Otherwise Serious Incident

If an apparent life-threatening and/or otherwise serious incident has occurred, the first person who identifies the situation shall sound the alarm to summon the site supervisor to the contamination reduction zone (intermittent 5-second blasts repeated until the site supervisor arrives). The site supervisor shall be apprised of the situation and told where the victim(s) is/are located. As the site supervisor proceeds to the accident scene, the HSO shall be summoned and communication channels shall be opened and kept on standby until the HSO has:

- ▶ Surveyed the scene
- ▶ Performed a primary survey of the victim

The site supervisor shall then determine if the Emergency Medical Services (EMS) should be summoned, what information must be relayed, and provide emergency action principles consistent with the injury. The site supervisor shall appoint a staff person or persons who will meet the EMS and have them quickly taken to the victim. If necessary, decontamination of the individual shall be performed at the direction of the site supervisor.

13.8.3 Nonlife-Threatening Incident

Should it be determined that no threat to life is present, the worker shall assist the injured person to the contamination reduction zone and contact the site supervisor or HSO.

13.8.4 Other Procedures

The area surrounding any serious accident is not to be disturbed until any changes to the site have been cleared by the site supervisor. The site supervisor shall immediately investigate the causes of all OSHA recordable accidents. Lost time injuries shall immediately be reported to the vice president of the Midwest Region.

13.9 FIRE EMERGENCY

Because of the possible presence of flammable materials on site, fire is an ever-present hazard. OHM personnel are not trained, professional firefighters. If there is any doubt that a fire can be quickly contained and extinguished, personnel are to sound the fire alarm and vacate the structure or area. The local fire department will be notified of the potential hazards at this project prior to the start of any work. The specific date and time of notification will be determined during the pre-construction meeting for this project. The following procedures will be used in the event of a fire.

13.9.1 Sound the Alarm

Anyone who sees a fire shall sound the alarm. The alarm is a 30-second blast on an air horn.



13.9.2 "Buddy" for Each Worker

Work crews shall be comprised of pairs of workers. Workers shall leave the work site with their respective "buddies" immediately after hearing the fire alarm.

13.9.3 Contained and Extinguished Fire

In the event of a small fire that the worker extinguishes, the on-scene foreman is to be summoned and the site supervisor is to be notified. All fires must be reported to the HSO and site supervisor.

13.9.4 General Alarm Response

On hearing the general alarm, the workers are to disconnect any electrical equipment in use (if possible), turn off combustion engines, and proceed to the nearest fire exit egress point.

13.9.5 Egress Instructions

Before workers begin operations in an area and on a daily basis, the site supervisor will give instructions on egress procedures and assembly points.

13.10 SPILL CONTAINMENT PROGRAM

The procedures defined below comprise the spill containment program in place for activities on site.

13.10.1 Fuel Spills

At times, there will be quantities of fuel on site that, if spilled, could have adverse environmental impact.

13.10.2 Measures for Preventing Fuel Spills

- ▶ Care shall be taken when transferring fuels.
- ▶ A containment dike around the fuel storage tanks shall be constructed.
- ▶ Inspect all fuel storage tanks for leaks daily.
- ▶ Inspect containment structure daily.



- ▶ Where spills, leaks, or ruptures may occur, adequate quantities of spill containment equipment (polypropylene absorbent pillows and sausages.) will be stationed in the immediate area. The spill containment program must be sufficient to contain and isolate the entire volume of hazardous substances being transferred.
- ▶ Fire extinguishing equipment meeting 29 CFR part 1910, subpart L shall be on hand and ready for use to control fires.

13.10.3 Response

Because OHM will be providing its own emergency response with respect to spills, the response time will be immediate. The proper authorities shall be notified as soon as is feasible.

The following response procedures for a diesel fuel spill of greater than 5 gallons will be used:

- ▶ Shut down operation in immediate area
- ▶ Limit ignition sources
- ▶ Suppress vapors as required
- ▶ Survey area with CGI/don protective equipment
- ▶ Pump liquids into drums
- ▶ Recover contaminated solids and place in containers
- ▶ Finish cleanup of residues

13.10.4 Notification

- ▶ OHM personnel--Project Manager
- ▶ USACE representative
- ▶ Other regulatory agencies as required

13.11 EVACUATION/RE-ENTRY

In all situations, when an on-site emergency results in evacuation of the exclusion zone, personnel shall not re-enter until:

- ▶ The conditions resulting in the emergency have been corrected.
- ▶ The hazards have been reassessed.
- ▶ The SSHP has been reviewed.
- ▶ Site personnel have been briefed on any changes in the SSHP.



APPENDIX A

**WORKER/VISITOR ACKNOWLEDGEMENT
TO HEALTH AND SAFETY PLAN**

WORKER/VISITOR ACKNOWLEDGMENT TO HEALTH-AND-SAFETY PLAN

I HAVE READ THE SITE-SAFETY PLAN FOR THIS SITE AND FULLY UNDERSTAND ITS CONTENTS. I AGREE TO FOLLOW THIS SITE SAFETY PLAN IN ALL RESPECT.

NAME

DATE _____

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

APPENDIX B

MATERIAL SAFETY DATA SHEETS

Anti-Fog Liquid

Calcium Hydroxide, Hydrated or Slaked Lime

Citri Kleen

Marafuel

Zinc, 1000 ppm

Nickel Metal

Mercury

Nickel, 1000 ppm

Lead (Inorganic)

Manganese Metal/Power

Cadmium

Compressed Air

Georgia Gulf

Georgia Gulf Corporation
Post Office Box 105197
Atlanta, Georgia 30348

Material Safety Data Sheet: Alpha Methylstyrene (AMS)

Date prepared

March, 1993

Product name

Alpha Methylstyrene (AMS)

Manufacturer's name and address

Georgia Gulf Corporation
P.O. Box 105197
Atlanta, GA 30348
(404) 395-4500

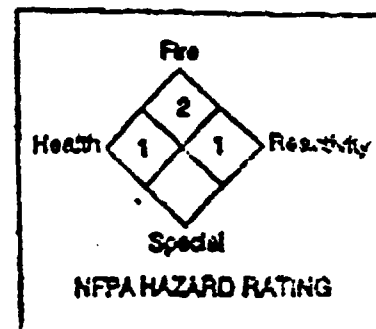
Emergency telephone number

Chemtrec (800) 424-8300

Use only in the event of chemical emergencies involving a spill, leak, fire or exposure or accident involving chemicals.

MSDS Information

MSDS Contact P.L. Logue
Phone Number (504) 389-2642
Monday - Friday 7:30 a.m. until 4:00 p.m.



1. Product Identification

Synonyms

Isopropenyl benzene, 2-phenylpropene,
beta-phenylpropene, beta-phenylpropylene,
1-methylethenyl-benzene, 1-methyl-1-phenylethylene

Chemical Formula

$C_6H_5C(CH_3)CH_2$

CAS Name & No.

Benzene (1-methylethenyl), 88-83-9

PRECAUTIONARY LABEL INFORMATION

WARNING: Moderately combustible liquid. Eye, skin and upper respiratory tract irritant. May cause central nervous system effects. Over exposure may cause drowsiness.

Material Safety Data Sheet: Alpha Methylstyrene (AMS)

2. Hazardous Ingredients

Component	CAS No.	Wt. %.	Exposure Limits			
			ACGIH TLV TWA	ACGIH TLV STEL	OSHA PEL TWA	OSHA PEL STEL
alpha Methyl- styrene (AMS)	98-83-9	> 99	50 ppm	100 ppm	50 ppm	100 ppm

NOTE: The NIOSH IDLH is 8000 ppm.

- ACGIH - American Conference of Governmental Industrial Hygienists
- OSHA - Occupational Safety and Health Administration
- TLV - Threshold Limit Value
- PEL - Permissible Exposure Limit
- STEL - Short-term Exposure Limit
- TWA - Time-Weighted Average
- NIOSH - National Institute for Occupational Safety and Health
- IDLH - Immediately Dangerous to Life and Health

3. Physical Data

Appearance	Colorless liquid
Odor	Pungent aromatic odor
Molecular Weight	118.2
Boiling Point	165° C
Melting Point	-22.78° C
Solubility	Slightly soluble in water (0.04%)
Specific Gravity (Water = 1.0)	1.9 mm Hg at 20° C
Vapor Density (Air = 1.0)	Not available
Vapor Pressure	1.9
pH	0.92 at 15.6° C

Material Safety Data Sheet: Alpha Methylstyrene (AMS)

4. Fire and Explosion Data

Flash Point 46° C (closed cup)

Flammable Limits (% By Vol.)

Lower Explosive Limit (LEL) 1.9
Upper Explosive Limit (UEL) 6.1

Autoignition Temperature 574° C

Fire Fighting Procedures/Fire Extinguishing Media

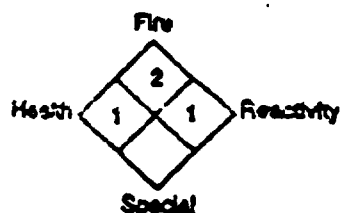
Keep unnecessary people away; isolate hazard area and deny entry. Avoid breathing vapors, stay upwind and out of low areas. Wear NIOSH approved self-contained respirator in the positive pressure mode and protective clothing. Structural firefighter's protective clothing will provide only limited protection. Use water spray, halon or carbon dioxide extinguishers, or alcohol foam for small fires. Direct streams of water tend to spread AMS fires and, as such, should not be used. Large fires should be extinguished with alcohol foam. Use water spray to cool containers exposed in heat of fire. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire.

Unusual Fire and Explosion Hazards

Dangerous fire and explosion hazard when exposed to heat or flame. AMS is combustible and forms explosive mixtures with air. AMS may be ignited by heat, sparks, flame, friction, and static electricity. AMS vapors may travel considerable distance to source of ignition and flash back. Fire may produce irritating or poisonous gases.

National Fire Protection Association Hazard Rating

- 4 = Extreme
- 3 = High
- 2 = Moderate
- 1 = Slight
- 0 = Insignificant



Material Safety Data Sheet: Alpha Methylstyrene (AMS)

5. Reactivity Data

Stability

Unstable.

Polymerization

Hazardous polymerization may occur; exhibits little tendency to polymerize thermally at temperatures up to 200° C; strong acids (e.g. concentrated H₂SO₄) can cause polymerization at room temperature.

Hazardous Decomposition Products

Heat and combustion produces carbon monoxide, carbon dioxide, irritating aldehydes, ketones, and organic acids.

Incompatible Materials

Oxidizing materials, copper, copper alloys, and acids.

6. Spill or Leak Procedures

Shut off all sources of ignition. No smoking or flames allowed in the spill area. Restrict access to spill area and move unprotected personnel upwind of the area. Keep out of low areas. Allow only trained personnel wearing appropriate protective clothing and self-contained breathing apparatus in the vicinity of the spill. Do not touch spilled material; stop leak if you can do so without risk. Prevent AMS from entering water bodies, drains, or any sewage collection system. AMS will float on water and the runoff will present an explosion or fire hazard. For small spills, take up with sand or other non-combustible absorbent material, and place into containers for later disposal. Control large spills by diking. Dispose all spill material in accordance with federal, state, and local regulations. AMS spills over the reportable quantity (100 lbs) should be reported to the National Response Center (800-424-8802).

Note: AMS is not listed in 40 CFR 302.4, but exhibits characteristics of ignitability in accordance with 40 CFR 261.21. According to 40 CFR 302.4, unlisted hazardous wastes meeting the requirements of 40 CFR 261.21 have a reportable quantity of 100 lbs.

7. Waste Disposal Methods

Waste must be disposed of in accordance with federal, state, and local regulations.

Material Safety Data Sheet: Alpha Methylstyrene (AMS)

8. Special Protection Information

Respiratory Protection

Use appropriate NIOSH approved respirator in accordance with 29 CFR 1910.134, to prevent overexposure. Respirators must be selected based on airborne levels found in the workplace and must not exceed the working limits of the respirator.

Eye Protection

Use splash proof chemical safety goggles or appropriate full-face respirator. Follow the eye and face protection guidelines of 29 CFR 1910.133. Where there is any possibility that the individual's eyes may be exposed to AMS, an eye wash fountain (in accordance with 29 CFR 1910.151) should be within the immediate work area for emergency use. Contact lenses should not be worn when working with this chemical.

Protective Gloves

Use polyvinyl alcohol (PVA) gloves. Note that PVA gloves are water soluble and cannot be used in water or water-based solutions.

Ventilation

Provide local ventilation to maintain exposure levels below recommended exposure limits.

Other

Where there is a possibility of exposure of an individual's body to AMS, facilities for quick drenching of the body should be provided (in accordance with 29 CFR 1910.151) within the immediate work area for emergency use. Such individuals should be provided with and required to use impervious clothing in accordance with 29 CFR 1910.132.

9. Special Precautions

Storage

Store AMS in a cool dry place in accordance with 29 CFR 1910.106 and away from heat and sources of ignition. Store in an area equipped with automatic sprinklers or fire extinguishing system. Store away from aluminum, iron oxide, and oxidizing materials including hydrogen peroxide and halogens. Ground and bond metal storage containers and transfer lines to prevent possible ignition from static sparks. Use spark resistant equipment to store AMS. Containers of this material may be hazardous when emptied. Since emptied containers retain product residues, assume emptied containers to have the same hazards as full containers. Follow all federal, state, and local regulations as well as all insurance codes when storing and handling AMS.

Material Safety Data Sheet: Alpha Methylstyrene (AMS)

10. Transportation Data/DOT Shipping Information

Proper shipping name	Isopropenylbenzene
Guide Sheet 27	
Hazard class	3, (Flammable liquid)
Shipping I.D. No.	UN 2303
PG ..	III
Labeling	Flammable liquid
Placard	Flammable
STCC Code	49-09-110

11. Human Health Hazard Data

Primary Routes of Entry

Inhalation, ingestion, skin, and eye contact.

Acute Effects

Alpha methylstyrene is an irritant to the eyes, skin, and upper respiratory tract. Central nervous system depression and drowsiness may also occur at high levels.

Chronic Effects

Prolonged exposure to alpha methylstyrene has been reported to interfere with Vitamin B12 metabolism. Chronic exposure to alpha methylstyrene may also produce reversible changes in visual acuity and light sensitivity. Prolonged skin contact may result in dermatitis, and repeated inhalation may cause central nervous system depression.

Potential Adverse Chemical Interactions

Persons with pre-existing skin diseases, chronic respiratory diseases, especially obstructive air disease, kidney or liver diseases may be at increased risk due to possible toxic or metabolic effects in these organs. The combination of alpha methylstyrene and butadiene has been shown to produce changes in liver enzymes in humans similar to those in occupational hepatitis and to decrease white blood cell counts in laboratory animals.

Carcinogen Status	OSHA	No
	NIOSH	No
	National Toxicology Programs	No
	IARC	No
	EPA	No

Material Safety Data Sheet: Alpha Methylstyrene (AMS)

alpha Methylstyrene is not considered carcinogenic by OSHA, NIOSH, NTP, IARC or EPA.

12. Animal Toxicity

Oral:	Rat LD ₅₀	4.9 g/kg
Inhalation:	Rat LC ₅₀	3,000 ppm
	Human TC ₁₀	600 ppm (eye irritation)

LC₅₀ = Lowest air concentration that is lethal to a given species in a given time.

LD₅₀ = Dose that is lethal to 50% of a given species by a given route of exposure.

TC₁₀ = Lowest air concentration that is toxic to a given species.

13. Emergency First Aid Procedures

Inhalation

If a person breathes large amounts of this chemical, move the individual to fresh air at once. If breathing has stopped, give artificial respiration. Keep the affected person warm and at rest. Get medical attention immediately.

Skin Contact

If this chemical contacts the skin, thoroughly flush the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly remove the clothing and flush the skin with water. If irritation persists after washing, get medical attention.

Eye Contact

If the chemical contacts the eyes, immediately wash the eyes with large amounts of room temperature water for at least 15 minutes, occasionally lifting the lower and upper lids. Get medical attention immediately and have the individual examined by an ophthalmologist. Contact lenses should not be worn when working with this chemical.

Ingestion

If the chemical is ingested do not induce vomiting. Get medical attention immediately.

Material Safety Data Sheet: Alpha Methylstyrene (AMS)

14 Regulatory Status**SARA Title III**

Section 302 and 304: Extremely Hazardous Substances (40 CFR 355)

<u>COMPONENT</u>	<u>CAS No.</u>	<u>TPQ (lbs)</u>	<u>RQ</u>
None	Applicable	Not Applicable	Not Applicable

NOTE: TPO - Threshold Planning Quantity
RQ - Reportable Quantity

Section 311 Hazard Categorization (40 CFR 370)

<u>ACUTE</u>	<u>CHRONIC</u>	<u>FIRE</u>	<u>PRESSURE</u>	<u>REACTIVE</u>
X	X	X		X

Section 313 Toxic Chemicals (40 CFR 372.65)

<u>COMPONENT</u>	<u>CAS No.</u>	<u>WT. %</u>
None	Not Applicable	Not Applicable

CERCLA

Section 102(a) Hazardous Substances (40 CFR 302.4)

<u>COMPONENT</u>	<u>CAS No.</u>	<u>WT. %</u>	<u>RQ (lbs)</u>
Not listed	Not Applicable	Not Applicable	Not Applicable

Note: AMS is not listed in 40 CFR 302.4, but exhibits characteristics of ignitability in accordance with 40 CFR 261.21. According to 40 CFR 302.4, unlisted hazardous wastes meeting the requirements of 40 CFR 261.21 have a reportable quantity of 100 lbs.

RCRA

40 CFR 261.21 Hazardous Waste Number:

AMS waste and material contaminated with AMS is regulated as an ignitable characteristic waste with the hazardous waste number D001.

TSCA

alpha Methylstyrene is listed on the TSCA inventory.



LAWTER INTERNATIONAL, INC.

8801 85TH STREET • PLAZA SAINT PIERRE, NY 12156-0343 • 414 847-7300

FAX TRANSMITTAL SHEET

() URGENT - DELIVERY IMMEDIATELY

DELIVER THIS MESSAGE TO:

Health & Safety

Ohm Corp

FAX NUMBER SENT TO:

419-424-4992

COPY TRANSMISSION TO:

FAX TRANSMISSION FROM:

T.B. Sheehan

DATE:

7/26

TIME:

NUMBER OF PAGES TRANSMITTED:

1

(INCLUDING COVER SHEET)

MESSAGE:

MSDS's

IF ALL DOCUMENTS ARE NOT RECEIVED CONTACT US AT 414-947-7300

IMPORTANT NOTICE

The information contained in this facsimile may be confidential. It is intended for receipt and use solely by the addressee(s) named above. If you are not the intended recipient, you are hereby notified that any disclosure, copying or use of this information is prohibited. If you have received this facsimile in error, please immediately notify us by telephone (at our expense). Thank you.

**MATERIAL SAFETY
DATA SHEET**

Ashland

Section 101 of the Federal Hazardous Substances Act
P.O. BOX 2219
COLUMBUS, OHIO 43216
(614) 889-3333

Emergency
Telephone
(800) 274-5263
(800) ASHLAND

000033

STYRENE MONOMER 50 PPM INHIBITOR

Pe

THIS MSDS COMPLIES WITH 29 CFR 1910.1200 (THE HAZARD COMMUNICATION STANDARD)

Product Name: STYRENE MONOMER 50 PPM INHIBITOR
CAS NUMBER: 100-42-5

05 23 051 0022235-757

Date Sheet No: 0022614-004,000
Prepared: 05/21/89
Supersedes: 12/22/88

SOUTHERN RESINS DIV.
LAWTER INTERNATIONAL, INC.
ATTN: PURCHASING DEPT.
P.O. BOX 128
MOUNDVILLE, AL 35474

PRODUCT:
INVOICE: REOST
INVOICE DATE: 05/10/83
TO:

SECTION 1 - PRODUCT IDENTIFICATION

General or Generic ID: AROMATIC HYDROCARBON

DOT Hazard Classification: FLAMMABLE LIQUID (173.115)

SECTION 2 - HAZARD IDENTIFICATION

IF PRESENT, IARC, NTP AND OSHA CARCINOGENS AND CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA TITLE III SECTION 313 ARE IDENTIFIED IN THIS SECTION.
SEE DEFINITION PAGE FOR CLARIFICATION

INGREDIENT	% (by WT)	PEL	TLV	NOTE
STYRENE CAS #: 100-42-5	100	50 PPM	50 PPM	(1)

Notes:

(1) ACCORDING TO A SHORT TERM EXPOSURE LIMIT (STEL) FOR STYRENE MONOMER IS 100 PPM. NIOSH RECOMMENDS A LIMIT OF 50 PPM, 8-HOUR TWA. 100 PPM IS MINUTE CEILING.

THIS CHEMICAL IS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF SARA TITLE III.

SECTION 3 - PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point	For PRODUCT	293.40 Deg F 145.22 Deg C 763.00 mm Hg
Vapor Pressure	For PRODUCT	4.90 mm Hg 68.00 Deg F 20.00 Deg C
Specific Vapor Density	AIR = 1	3.6
Specific Gravity		0.907 77.00 Deg F 25.00 Deg C
Percent Volatiles		100.00%
Evaporation Rate	(N-Butyl Acetate = 1)	.48

SECTION 4 - FIRE AND EXPLOSION INFORMATION

FLASH POINT(1CC) 86.0 Deg F (31.1 Deg C)
EXPLOSIVE LIMIT (PRODUCT) LOWER - 1.1%
EXTINGUISHING MEDIA: REGULAR FOAM OR WATER FOG OR CARBON DIOXIDE OR DRY CHEMICAL
HAZARDOUS DECOMPOSITION PRODUCTS: MAY FORM TOXIC MATERIALS: CARBON DIOXIDE AND CARBON MONOXIDE, VARIOUS HYDROCARBONS, ETC.
FIREFIGHTING PROCEDURES: WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE DEMO MODE WHEN FIGHTING FIRES.
SPECIAL FIRE & EXPLOSION HAZARDS: VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL ALONG THE GROUND OR MAY BE MIXED BY VENTILATION AND IGNITED BY PILOT LIGHTS, OTHER FLAMES, SPARKS, HEATERS, SMOKING, ELECTRIC MOTORS, STATIC DISCHARGE, OR OTHER IGNITION SOURCES AT LOCATIONS DISTANT FROM MATERIAL HANDLING POINT.
NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.
ALL FIVE GALLON PAILS AND LARGER METAL CONTAINERS INCLUDING TANK CARS AND TANK TRUCKS SHOULD BE GROUNDED AND/OR BONDED WHEN MATERIAL IS TRANSFERRED.

NFPA CODES: HEALTH- 2 FLAMMABILITY- 3 REACTIVITY- 2

SECTION 5 - CONTROL MEASURES

PERMISSIBLE EXPOSURE LEVEL 50 PPM
THRESHOLD LIMIT VALUE 50 PPM

EFFECTS OF ACUTE OVEREXPOSURE:

EYES - CAN CAUSE SEVERE IRRITATION, REDNESS, TEARING, BLURRED VISION.
SKIN - PROLONGED OR REPEATED CONTACT CAN CAUSE MODERATE IRRITATION, DRYING, DERMATITIS.

CONTINUED ON PAGE: 2

MATERIAL SAFETY
DATA SHEET**Ashland**P.O. BOX 2219
COLUMBUS, OHIO 43216
(614) 889-3333Emergency
Telephone
1(800) 274-5263
1(800) ASKLAND

00

STYRENE MONOMER 50 PPM INHIBITOR

STYRENE Page: 2~~SECTION 1 - HAZARD DATA CONTINUED~~

BREATHING - EXCESSIVE INHALATION OF VAPOR CAN CAUSE NASAL AND RESPIRATORY IRRITATION, CENTRAL NERVOUS SYSTEM EFFECTS INCLUDING DIZZINESS, WEAKNESS, FATIGUE, NAUSEA, HEADACHE AND POSSIBLE INCOORDINATENESS, AND EVEN DEATH.

SWALLOWING - CAN CAUSE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING, AND DIARRHEA. ASPIRATION OF MATERIAL INTO THE LUNGS CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL.

FIRST AID:

IF ON SKIN: THOROUGHLY WASH EXPOSED AREA WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. LAUNDRY CONTAMINATED CLOTHING BEFORE RE-USE.

IF IN EYES: FLUSH WITH LARGE AMOUNTS OF WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY. GET MEDICAL ATTENTION.

IF SWALLOWED: DO NOT INDUCE VOMITING. KEEP PERSON WARM, QUIET, AND GET MEDICAL ATTENTION. ASPIRATION OF MATERIAL INTO THE LUNGS DUE TO VOMITING CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL.

IF BREATHED: IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET AND GET MEDICAL ATTENTION.

PRIMARY ROUTE(S) OF ENTRY:

INHALATION, SKIN CONTACT

EFFECTS OF CHRONIC OVEREXPOSURE:

THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) HAS CLASSIFIED STYRENE IN GROUP 2B (POSSIBLY CARCINOGENIC TO HUMANS). THIS CLASSIFICATION IS NOT BASED ON ANY SIGNIFICANT NEW EVIDENCE THAT STYRENE MAY BE CARCINOGENIC, BUT RATHER ON A REVISED DEFINITION FOR GROUP 2B AND CONSIDERATION OF NEW DATA ON STYRENE OXIDE. A NUMBER OF LIFETIME ANIMAL STUDIES WITH STYRENE INCLUDING THOSE CONDUCTED IN THE NCI BIOASSAY PROGRAM HAVE NOT SHOWN STYRENE TO BE CARCINOGENIC.

OVEREXPOSURE TO STYRENE HAS APPARENTLY BEEN FOUND TO CAUSE THE FOLLOWING EFFECTS IN LABORATORY ANIMALS: LIVER ABNORMALITIES, KIDNEY DAMAGE AND LUNG DAMAGE.

~~SECTION 2 - HAZARD DATA CONTINUED~~

HAZARDOUS POLYMERIZATION: CAN OCCUR. - AVOID EXPOSURE TO EXCESSIVE HEAT, PEROXIDES AND POLYMERIZATION CATALYSTS.

STABILITY: STABLE

COMPATIBILITY: AVOID CONTACT WITH: STRONG MINERAL ACIDS.

~~SECTION 3 - HAZARD DATA CONTINUED~~**STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:**

SMALL SPILL: ABSORB LIQUID ON VERMICULITE, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND TRANSFER TO HOOD. ELIMINATE ALL SOURCES OF IGNITION SUCH AS FLARES, FLAMES (INCLUDING PILOT LIGHTS), AND ELECTRICAL SPARKS. VENTILATE AREA.

LARGE SPILL: ELIMINATE ALL IGNITION SOURCES (FLARES, FLAMES INCLUDING PILOT LIGHTS, ELECTRICAL SPARKS). PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP HAS BEEN COMPLETED. STOP SPILL AT SOURCE. PREVENT FROM ENTERING DRAINS, SEWERS, STREAMS OR OTHER BODIES OF WATER. PREVENT FROM SPREADING. IF RUNOFF OCCURS, NOTIFY AUTHORITIES AS REQUIRED. PUMP OR VACUUM TRANSFER SPILLER PRODUCT TO CLEAN CONTAINERS FOR RECOVERY. ABSORB UNRECOVERABLE PRODUCT. TRANSFER CONTAMINATED ABSORBENT, SOIL AND OTHER MATERIALS TO CONTAINERS FOR DISPOSAL.

WASTE DISPOSAL METHOD:

SMALL SPILL: ALLOW VOLATILE PORTION TO EVAPORATE IN HOOD. ALLOW SUFFICIENT TIME FOR VAPORS TO COMPLETELY CLEAR HOOD DUCT WORK. DISPOSE OF REMAINING MATERIAL IN ACCORDANCE WITH APPLICABLE REGULATIONS.

LARGE SPILL: DESTROY BY LIQUID INCINERATION IN ACCORDANCE WITH APPLICABLE REGULATIONS.

~~SECTION 4 - HAZARD DATA CONTINUED~~

RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR ANY COMPONENT IS EXCEEDED (SEE SECTION 11), A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

VENTILATION: PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).

PROTECTIVE GLOVES: WEAR RESISTANT GLOVES SUCH AS: POLYETHYLENE

EYE PROTECTION: CHEMICAL SPLASH GOGGLES IN COMPLIANCE WITH OSHA REGULATIONS ARE ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER TYPE SAFETY GLASSES. (CONSULT YOUR SAFETY EQUIPMENT SUPPLIER)

OTHER PROTECTIVE EQUIPMENT: TO PREVENT REPEATED OR PROLONGED SKIN CONTACT, WEAR IMPERVIOUS CLOTHING AND BOOTS.

~~SECTION 5 - HAZARD DATA CONTINUED~~

INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.

Product Name: ACRYLIC ACID, GLACIAL
 Product Code: 342113
 MSDS Number : 810
 Version Date: 02/01/1994

Page 1 of 10

Material Safety Data Sheet

Print Date - February 1st, 1994 10:34 AM PS P24 P8FTH - 21, 312

----- 1. CHEMICAL PRODUCT and COMPANY IDENTIFICATION -----

PRODUCT NAME: ACRYLIC ACID, GLACIAL

SYNONYMS: ACRYLIC ACID, GLACIAL
 ACROLEIC ACID
 ETHEYLENECARBOXYLIC ACID
 PROPENE ACID
 VINYLFORMIC ACID
 2-PROPENOIC ACID

HOECHST CELANESE CHEMICAL GROUP
 1601 W. LBJ FREEWAY
 PO BOX 819005
 DALLAS, TX 753619005

----- 2. COMPOSITION / INFORMATION ON INGREDIENTS -----

COMPONENT	CAS NUMBER	
ACRYLIC ACID *	79-10-7	99.6%
* OSHA hazardous according to 29 CFR 1910.1200		

Monomethyl ether of hydroquinone (CAS 150-76-5) is present at 180-220 ppm as an inhibitor. Dissolved air must be present in order for inhibitor to function effectively.

----- 3. HAZARDS IDENTIFICATION -----

EMERGENCY OVERVIEW:

Acrylic acid is a clear, colorless, mobile liquid with a strong, acrid odor.

HAZARD:

Flammable

May polymerize explosively if contaminated

POTENTIAL HEALTH EFFECTS

ROUTES OF EXPOSURE:

Skin, eyes, inhalation, ingestion.

TRANSPORTATION EMERGENCY: 1-800-424-6000	IN U.S., CHEMICAL - 24 HRS/DAY
PRODUCT EMERGENCY: 1-800-424-6000	HOECHST CELANESE, 24 HRS/DAY
PRODUCT INFORMATION: 1-800-424-6000	(7:30 AM TO 4:00 PM, CST)

INSULATION:

Remove patient from contaminated area. If breathing has stopped, give artificial respiration, then oxygen if needed. Contact a physician immediately.

INGESTION:

Patient should be made to drink large quantities of water. Do not induce vomiting. Contact a physician immediately.

NFPA (H, F, R): 3, 2, 2

FLAMMABLE PROPERTIES

FLASHPOINT CLOSED CU: 122.0 F (50.0 C)
FLASHPOINT OPEN CUP : 129.0 F (53.9 C)
UPPER EXPLOSIVE LMT : 8.0 %
In air by volume.
LOWER EXPLOSIVE LMT : 2.0 %
In air by volume.

PROJECTS OF COMBUSTION:

Oxides of carbon.

EXTINGUISHING MEDIA:

Use carbon dioxide or dry chemical for small fires; alcohol-type aqueous film-forming foam or water spray for large fires.

FIRE FIGHTING INSTRUCTIONS:

If potential for exposure to vapors or products of combustion exists, wear complete personal protective equipment, including self-contained breathing apparatus with full face-piece operated in pressure demand or other positive pressure mode. Water spray can be used to reduce intensity of flames and to dilute spills to nonflammable mixture. Use water spray to cool fire-exposed structures and vessels. Rapid, uncontrolled polymerization can cause explosion.

TRANSPORTATION EMERGENCY (600)	424 9300	IN U.S. CONTROL - 24 HRS/DAV
PRODUCT EMERGENCY (600)	825 5375	MONDAY THROUGH, 24 HRS/DAV
PRODUCT INFORMATION (214)	377 5000	(7:30 AM TO 4:35 PM, CST)

Product Name: ACRYLIC ACID, GLACIAL
Product Code: J42113
MSDS Number : #10
Version Date: 02/01/1994

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6. ACCIDENTAL RELEASE MEASURES

Eliminate ignition sources. Caution: Spontaneous polymerization can occur. Avoid eye or skin contact; see "Section 8 - Exposure Controls/Personal Protection" for respirator information. Place leaking containers in well-ventilated area with spill containment. If fire potential exists, blanket spill with alcohol-type aqueous film-forming foam or use water spray to disperse vapors. Contain spill to facilitate clean-up. Clean-up methods may include absorbent materials, vacuum truck, etc. Avoid runoff into storm sewers and ditches which lead to natural waterways. If an odor or acidity problem exists, neutralize with lime or sodium bicarbonate.

Call the National Response Center (800 424 8802) if the quantity (of any component) spilled is equal to or greater than the reportable quantity (RQ) under CERCLA "Superfund": 5000 lb/day.

For more information, see "Section 15 - Regulatory Information".

7. HANDLING AND STORAGE

To Prevent Hazardous Polymerization:

Store in a well-ventilated area at product temperatures between 15 C and 25 C (59 F and 77 F). Drums of acrylic acid should not be stored for periods exceeding one year. If product solidifies, melt only in a temperature-controlled environment. Use only tempered water, 45 C (113 F) maximum temperature, to thaw bulk containers. Drums may be thawed by placing in a heated room at temperatures between 20 C and 33 C (66 F and 91 F). Product being melted, particularly in 55-gallon drums, should be agitated at regular intervals by rolling to assure thorough mixing and distribution of the polymerization inhibitor. NEVER USE STEAM OR ELECTRICAL HEATING SYSTEMS (SUCH AS TAPES, MANTLES OR JACKETS) TO THAW THIS PRODUCT. As soon as material is thawed, normal storage temperatures (15 to 25 C; 59 to 77 F) should be established.

Keep away from heat, sparks and flame.
Use spark-resistant tools.

TRANSPORTATION EMERGENCY: (800) 424 8802
PRODUCT EMERGENCY: (800) 835 5335
PRODUCT INFORMATION: (214) 277 4001

IN U.S. CHEMTREC - 24 HRS/DAY
HOECHST CELANESE 24 HRS/DAY
(7 30 AM TO 4 15 PM CST)

Product Name: ACRYLIC ACID, GLACIAL
 Product Code: 342113
 MSDS Number : 010
 Version Date: 02/01/1994

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7. HANDLING and STORAGE (continued)

Keep containers closed when not in use. Do not load into compartments adjacent to heated cargo. Samples should be stored in opaque or amber glass containers. Always open containers slowly to allow any excess pressure to vent. Use only DOT-approved containers. When transferring, follow proper grounding procedures. Use with adequate ventilation. Avoid breathing vapor. Avoid contact with eyes, skin and clothing. Wash thoroughly with soap and water after handling. Decontaminate soiled clothing thoroughly. Discard contaminated leather clothing. AIF SHOULD BE USED TO BLANKET AND SPARGE STORAGE VESSELS IN ORDER FOR INHIBITOR TO FUNCTION. OXYGEN-FREE ATMOSPHERES SHOULD NEVER BE USED.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS:

General or dilution ventilation is frequently insufficient as the sole means of controlling employee exposure. Local ventilation is usually preferred.

PROTECTIVE EQUIPMENT

A safety shower and eye bath should be readily available.

SKIN:

For operations where spills or splashing can occur, use chemical protective clothing, including gloves (neoprene or rubber) and boots.

EYES:

Chemical safety goggles.

INHALATION:

Based on workplace contaminant level and working limits of the respirator, use a respirator approved by NIOSH/MSHA. The following is the minimum recommended equipment for an acceptable level of exposure. To estimate an acceptable level of exposure see "Section 3 - Hazards Identification", "Section 5 - Exposure Controls/Personal Protection" and "Section 11 - Toxicological Information".

>= 1 and <= 10 times the acceptable level: Use air-purifying respirator with full facepiece and organic vapor can-

TRANSPORTATION EMERGENCY: (800) 424-9309
 PRODUCT EMERGENCY: (800) 835-5238
 PRODUCT INFORMATION: (214) 277-4000

IN U.S., CHEMTREC - 24 HRS/DAY
 HOECHST CELANESE, 24 HRS/DAY
 (7:00 AM TO 4:00 PM, CST)

Product Name: ACRYLIC ACID, GLACIAL
Product Code: 342113
MSDS Number : 810
Version Date: 02/01/1994

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Print Date - February 10, 1994 10:34 a.m. PS PSA PEPH - 2.0 (1/92)

8. EXPOSURE CONTROLS / PERSONAL PROTECTION (continued)

tridge(s) or air-purifying full facepiece respirator with an organic vapor canister or a full facepiece powered air-purifying respirator fitted with organic vapor cartridge(s).

> 10 and the lower of either < 100 times the acceptable level or < the IDLH. Use positive-pressure full facepiece supplied-air respirator, or continuous-flow full facepiece supplied-air respirator.

>= 100 times the acceptable level or IDLH level or unknown concentration (such as in emergencies): Use positive-pressure self-contained breathing apparatus with full facepiece. Positive-pressure supplied-air respirator with full facepiece equipped with an auxiliary positive-pressure self-contained breathing apparatus escape system.

For escape: Use self-contained breathing apparatus with full facepiece or any respirator specifically approved for escape.

EXPOSURE GUIDELINES:

ACRYLIC ACID (79-10-7)

OSHA PEL	ACGIH TLV
-----	2 PPM (TWA)

MONOMETHYL ETHER OF HYDROQUINONE (150-76-5)

OSHA PEL	ACGIH TLV
-----	5 MG/M3 (TWA)

ACGIH has given acrylic acid a skin designation.

Hoechst Celanese has adopted the ACGIH TLV.

Immediately Dangerous to Life or Health (IDLH) level:
No value established.

TRANSPORTATION EMERGENCY: 1-800-634-6300	IN U.S. QUANTITIES - 24 HRS/DAY
PRODUCT EMERGENCY: 1-800-835-5235	HOECHST CELANESE 24 HRS/DAY
PRODUCT INFORMATION: 1-214-277-4000	7:00 AM TO 4:00 PM (CST)

SECRET

Product Name: ACRYLIC ACID, GLACIAL
Product Code: 342113
MSDS Number : #10
Version Date: 02/01/1994

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11. TOXICOLOGICAL INFORMATION

Oral LD50 : 0.34 g/kg (rats); moderately toxic to animals.

Dermal LD50 : 0.29 g/kg (rabbits); moderately toxic to animals by absorption.

Inhalation LC50 : 4900 ppm (rats, 4 hrs); slightly toxic to animals.

Eye : Can cause chemical burn--damage irreversible. Vapors are extremely irritating.

Mutagenicity : Approximately 12 standard mutagenicity studies have been conducted with acrylic acid. All in vivo studies and the majority of in vitro studies (including the Ames test) have been negative.

Carcinogenicity : Acrylic acid was not carcinogenic in a well-conducted drinking water study in rats at concentrations up to 1200 ppm and in well-conducted lifetime dermal studies in mice. It was reported to cause a small number of tumors in other dermal studies which lack scientific validity due to questionable study conduct and documentation. The weight of experimental evidence indicates that acrylic acid does not possess carcinogenic potential. OSHA, NTP and IARC do not list acrylic acid as a carcinogen.

Reproduction : No evidence of teratogenicity in rats; inhalation study Reported to not adversely affect reproduction in rats, oral exposure (Intercompany Acrylate Study Group).

Other : Inflammation and alteration of nasal mucosa in rats and mice exposed to acrylic acid vapors for 90 days. (Intercompany Acrylate Study Group).

12. ECOLOGICAL INFORMATION

This information is being researched.

TRANSPORTATION EMERGENCY: (800) 424-9300
PRODUCT EMERGENCY: (800) 424-9300
PRODUCT INFORMATION: (214) 277-4000

IN U.S. COUNTRIES: 24 HRS/DAY
HOECHST CELANESE: 24 HRS/DAY
7:30 AM TO 4:15 PM, CST)

Product Name: ACRYLIC ACID, GLACIAL
 Product Code: 342113
 MSDS Number : 810
 Version Date: 02/01/1994

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----- 13. DISPOSAL CONSIDERATIONS -----

All notification, clean-up and disposal should be carried out in accordance with federal, state and local regulations. Preferred methods of waste disposal are incineration or biological treatment in federal/state approved facility.

Hazardous waste (40 CFR 261): Yes: U008, D001.

----- 14. TRANSPORT INFORMATION -----

DOT proper shipping name : Acrylic Acid, Inhibited
 DOT hazard class : 8, Corrosive Material
 Subsidiary hazard : Flammable Liquid
 UN/NA identification number: UN2218
 Packing group : II
 ER guidebook number : 29
 Reportable quantity (RQ) : 5000 lb/2270 kg

----- 15. REGULATORY INFORMATION -----

STATE REGULATIONS

The following chemicals associated with the product are subject to the right-to-know regulations in these states:

ACRYLIC ACID (79-10-7): CT, FL, IL, LA, MA, NJ, NY, PA, RI

MONOMETHYL ETHER OF HYDROQUINONE (150-76-5): FL, IL, LA, MA,
 NJ, PA, RI

U.S. FEDERAL REGULATIONS

We certify that all components are either on the TSCA inventory or qualify for an exemption.

SARA 313
 ACRYLIC ACID 99.8% (79-10-7)

ENVIRONMENTAL:

CERCLA : ACRYLIC ACID 99.8% (79-10-7)

SARA 304 : ACRYLIC ACID 99.8% (79-10-7)

TRANSPORTATION EMERGENCY.....(800) 434 9300	IN U.S., CHEMTREC - 24 HRS/LAT
PRODUCT EMERGENCY.....(800) 835 5335	HOECHST CELANESE, 24 HRS/247
PRODUCT INFORMATION.....(214) 277 4000	(7-30 AM TO 4:15 PM, CST)

Product Name: ACRYLIC ACID, GLACIAL
 Product Code: 342113
 MSDS Number : 410
 Version Date: 02/01/1994

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15. REGULATORY INFORMATION (continued)

SARA 311 : Acute health----- Yes
 Chronic health----- Yes
 Fire----- Yes
 Sudden release of pressure-- No
 Reactive----- Yes

INTERNATIONAL REGULATIONS

Listed on the chemical inventories of the following countries: Australia, Canada, Europe (EINECS), Japan and Korea.

16. OTHER INFORMATION

HAZARD RATINGS

	HEALTH	FLAMM	REACT	OTHER
NIHA	3	2	2	
HMIS	3	2	2	

DISCLAIMER:

The information contained herein is accurate to the best of our knowledge. We do not suggest or guarantee that any hazards listed herein are the only ones which exist. Hoechst Celanese Chemical Group, Inc. makes no warranty of any kind, express or implied, concerning the safe use of this material in your process or in combination with other substances. Effects can be aggravated by other materials and/or this material may aggravate or add to the effects of other materials. This material may be released from gas, liquid, or solid materials made directly or indirectly from it. User has the sole responsibility to determine the suitability of the materials for any use and the manner of use contemplated. User must meet all applicable safety and health standards.

TRANSPORTATION EMERGENCY: (800) 424 9100
 PRODUCT EMERGENCY: (800) 835 5235
 PRODUCT INFORMATION: (214) 277 4000

IN U.S.: CHEMTREC - 24 HRS/DAY
 HOECHST CELANESE, 24 HRS/DAY
 (7:30 AM TO 6:15 PM, CST)



Section 1. Material Identification

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Formaldehyde (HCHO) Description: Derived by oxidation of synthetic methanol or low-boiling petroleum gases such as butane or propane with copper, silver, or iron-molybdenum oxide catalysts. Gaseous formaldehyde is not commercially available because of its tendency to polymerize. It is sold as a 30 to 56% solution containing 0.5 to 15% methanol as an inhibitor. HCHO may also be inhibited with stabilizers such as cellulose ethers or isophthalobis guanamine. Used to manufacture rubber, plastics, urea-formaldehyde resins (used as adhesives in particle board, plywood, and insulating materials), in permanent-press fabrics, photographic film, leather, cosmetics, embalming fluid, insulation (foams), wood preservatives; as a chemical intermediate, stabilizer in gasoline, corrosion inhibitor in metal industries, starch modifier, disinfectant, fumigant, and in medicine (athletes foot medicine & cough drops). Other Designations: CAS No. 50-00-0, formalin, Formalith, formic aldehyde, Pyde, Lysoform, methanal, methyl aldehyde, Morbicid, oxymethylene.

Liquid	
R 2	HMIS
I 4	H 3
S 3	F 2
K 2	R 2
Gas	
R 2	HMIS
I 4	H 3
S 2	F 4
K 2	R 2

NFPA	
2	3
0	0
PPE-Sec. 8	
4	0
3	0

Manufacturers: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*TM for suppliers list.

Cautions: Formaldehyde gas is intensely irritating to the eyes and respiratory tract; the liquid (formalin) is corrosive and causes severe eye and skin burns. Formaldehyde is a suspected human carcinogen. Use extreme caution. Avoid vapor inhalation and skin contact.

Section 2. Ingredients and Occupational Exposure Limits

Formaldehyde (formalin solution, 30 to 56%). Impurities include methanol (0.5 to 15% as stabilizer), formic acid, ash, and iron.

1991 OSHA PEL
8-hr TWA: 0.75 ppm (See Formaldehyde Standard, 29 CFR 1910.1048)

1992-93 ACGIH TLVs*
TWA: 1 ppm (1.2 mg/m³)
STEL: 2 ppm (2.5 mg/m³)

1985-86 Toxicity Data†
Human, inhalation, TC_{LD}: 17 mg/m³/30 min caused watering eyes and respiration changes.

1990 IDLH Level
30 ppm

1990 DFG (Germany) MAK
TWA: 0.5 ppm (0.6 mg/m³)
Category 1: local irritants
Peak Exposure Limit: 1 ppm, 5 min momentary value, 8/shift

Human, eye: 4 ppm/5 min caused irritation.
Human, skin: 150 µg administered intermittently for 3 days caused mild irritation.
Human, lung: 100 µmol/L caused DNA damage.
Women, oral, LD₅₀: 108 mg/kg; toxic effects not yet reviewed
Rat, oral, LD₅₀: 800 mg/kg; toxic effects not yet reviewed

* Notice of intended change to 0.3 ppm, 0.37 mg/m³.

† See NIOSH, RTECS (LP8925000), for additional irritation, mutation, reproductive, tumorigenic, and toxicity data.

Section 3. Physical Data

Molecular Weight: 30.03
Specific Gravity: 1.1 at 77 °F (25 °C)
pH: 2.8 to 4.0 (% solution not specified)
Odor Threshold: 0.059 to 0.073
Freezing Point: gas, -134 °F (-92 °C)
Ionization Potential: -10.88 eV
Wt/Gal: 9.1 lb.
Refraction Index: 1.3746 at 68 °F (20 °C/D)

Boiling Point: gas, -6 °F (-21 °C); methanol-free liquid, -213.8 °F (101 °C); 15% methanol added, 204.8 °F (96 °C)
Water Solubility: Miscible
Other Solubilities: Miscible in acetone, benzene, chloroform, diethyl ether, ethanol, & ether.
Saturated Vapor Density (Air = 0.75 lb/ft³ or 1.2 kg/m³): 0.07506 lb/ft³ or 1.20096 kg/m³
Vapor Pressure: 17.2 mm Hg at 77 °F (25 °C), 10 mm Hg at -126.4 °F (-83 °C)
Appearance and Odor: Flammable, colorless gas or liquid with a pungent, suffocating odor.

Section 4. Fire and Explosion Data

Flash Point: Room temp°, 182 °F/83 °C†, 122 °F/50 °C‡ | Autoignition Temperature: 572 °F/300 °C*, 806 °F/430 °C†‡ | LEL: 7% v/v | UEL: 73% v/v

Extinguishing Media: Formalin is a Class III combustible liquid. Fight fire with dry chemical, carbon dioxide (CO₂), water spray, or 'alcohol-resistant' foam. **Unusual Fire or Explosion Hazards:** Vapors may travel to an ignition source and flash back. Container may explode in heat of fire. Formalin poses a vapor explosion hazard indoors, outdoors, and in sewers. **Special Fire-fighting Procedures:** Since fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighters' protective clothing provides limited protection. If possible without risk, stop gas/liquid flow and remove container from fire area. If impossible, apply cooling water to sides of container until well after fire is out. Do not get water inside containers. Stay away from ends of tanks. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire. Do not release runoff from fire control methods to sewers or waterways.

* (gas), † (methanol-free liquid), ‡ (15% methanol added)

Section 5. Reactivity Data

Stability/Polymerization: Formaldehyde polymerizes readily in both its gaseous and liquid state and slowly oxidizes in air to formic acid. Methanol, cellulose ethers, or isophthalobis guanamine are added as inhibitors. On standing, especially in cold, HCHO may become cloudy and on exposure to very low temps, a ppt of trioxymethylene is formed. **Chemical Incompatibilities:** The liquid corrodes carbon steel but the vapor does not. Reaction with hydrogen chloride in humid air can yield an indeterminate amount of bischloromethyl ether which is considered a dangerous carcinogen. Incompatible with hydrogen peroxide, magnesium carbonate hydroxide, nitromethane, peroxyformic acid, phenol, potassium permanganate, performic acid, perchloric acid + aniline, and nitrogen dioxide (explosive at 180 °C). **Conditions to Avoid:** Exposure to heat, ignition sources, and incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of HCHO can produce CO₂, acrid smoke, and toxic vapors.

Section 6. Health Hazard Data

Carcinogenicity: Formaldehyde is classified as an IARC-2A (Probably carcinogenic to humans, limited human & sufficient animal evidence),⁽¹⁴⁰⁾ NTP-2 (Reasonably anticipated to be a carcinogen, limited human & sufficient animal evidence),⁽¹⁴¹⁾ NIOSH-X (carcinogen defined without further categorization),⁽¹⁴²⁾ TLV-A2 (suspected human carcinogen),⁽¹⁴³⁾ DFG MAK-B (justifiably suspected of having carcinogenic potential),⁽¹⁴⁴⁾ and OSHA-X (carcinogen defined without further categorization).⁽¹⁴⁵⁾ A statistically significant increase in pharyngeal cancer is seen in HCHO exposed workers. However, these reports are challenged by some authorities who suggest the size of some studied groups was too small to give accurate information. **Summary of Risks:** HCHO is very toxic. Gas and vapors are irritating at very low levels. HCHO is among the most common causes of occupational skin disease. Formalin is corrosive to the skin and mucous membranes; severity depends on concentration. Skin sensitization (to as low as 1 part in 5 million) occurs in some individuals and is usually permanent. Induced asthma is a controversial issue. Excessive or repeated exposure can cause kidney damage. HCHO is metabolized to formic acid and excreted in the urine. Scanty or infrequent menstruation and low birthweight children were reported from women exposed to urea-formaldehyde resin, although the results of these studies are inconclusive. It is thought that exposure to recommended limits does not pose a reproductive hazard but exposure to higher levels may.

Continue on next page

Section 6. Health Hazard Data

Medical Conditions Aggravated by Long-Term Exposure: Dermatitis and kidney and respiratory disorders. **Target Organs:** Eyes, skin, respiratory system, kidney, and central nervous system (in severe exposures). **Primary Entry Routes:** Inhalation, ingestion, skin & eye contact. **Acute Effects:** Inhalation causes irritation of eyes, nose, and upper respiratory tract. Irritation and watering of eyes (tearing) occur at levels as low as 0.1 to 0.3 ppm but usually at 2 to 3 ppm. Some tolerance is achieved at this level so repeated exposures to 2 to 3 ppm is possible without noticeable effect. At 4 to 5 ppm mucous membrane irritation and tearing are more pronounced; exposure is very uncomfortable after 30 min. 10 ppm can be tolerated only a few minutes, causing severe tearing. At 10 to 20 ppm, breathing difficulty occurs with cough and burning of nose and throat. When exposure stops, tearing ceases but respiratory irritation persists for ~1 hr. Exposure to 50 to 100 ppm for 5 to 10 min is expected to cause severe injury edema (fluid in lungs), pneumonitis, and possible death. Skin contact causes immediate and delayed effects. Some people show immediate reaction with redness and blistering while others are symptom-free for 7 to 10 days after 1st contact. After this induction period, subsequent contact causes itching, redness, swelling, scaling, & multiple small blisters. Splashes to the eyes have caused injuries ranging from minor transient injury to severe, permanent corneal opacification and vision loss, depending on concentration. Ingestion of as little as 30 cc of a 37% solution has resulted in death although higher doses have been tolerated by some individuals. Symptoms include immediate burning sensation in mouth, esophagus, and stomach; abdominal pain, cramps, nausea & vomiting, diarrhea (may be bloody), digestive hemorrhage, and ulceration and perforation of the stomach. Systemic effects generally occur after heavy exposures and include CNS depression, metabolic acidosis (secondary to rapid formation/accumulation of formic acid), vertigo, convulsions, stupor, and coma. Death is usually due to respiratory failure. **Chronic Effects:** Repeated skin contact results in brown discoloration and thickening of the skin with scaling and fissuring. Nail dystrophy (decay) may also occur. Formaldehyde is considered a suspected carcinogen.

FIRST AID **Eyes:** Do not allow victim to rub or keep eyes tightly shut. Gently lift lids and flush with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately. **Skin:** Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center and unless otherwise advised, have that conscious and alert person drink 1 to 2 glasses of water or milk with ammonium acetate, then induce vomiting. Follow by gastric lavage (within 15 minutes after ingestion) with a 0.1% ammonia solution to convert formaldehyde to relatively inert pentamethylenetetramine. Note to Physicians: Monitor arterial blood gases and methanol levels after significant ingestion. Hemodialysis may be effective in formaldehyde removal. Use formic acid in urine and formaldehyde in blood or expired air as diagnostic tests.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Shut off ignition sources. Shut off gas flow. If unable, install a pressure control/release cover over valve assembly. Use water spray to cool and disperse vapors, dilute spills to form nonflammable mixtures, and protect personnel. Do not get water inside container. Take up small spills with earth, sand, vermiculite, or other absorbent, noncombustible material and place in suitable containers. Dike far ahead of large spills for later reclamation or disposal. Neutralize remaining residue with a dilute sodium bisulfite solution. Follow applicable OSHA regulations (29 CFR 1910.120). **Ecotoxicity Values:** Bluegill (*Lepomis macrochirus*), $LC_{50} = 100 \text{ mcg/L/96 hr}$; lake trout (*Salvelinus namaycush*) $LC_{50} = 100 \mu\text{L/L/96 hr}$; atlantic salmon (*Salmo salar*) $LC_{50} = 173 \mu\text{L/L/96 hr}$. **Environmental Degradation:** Formaldehyde leaches rapidly when released to soil. It biodegrades to low levels in a few days and will not absorb to sediment. In air, formaldehyde photolyzes and reacts rapidly with hydroxyl radicals. Half-life in sunlight is a few hours. **Disposal:** Formaldehyde is a good candidate for rotary kiln incineration at 1508 to 2912 °F (820 to 1600 °C) and fluidized bed incineration at 842 to 1796 °F (450 to 980 °C). Formaldehyde may be removed from waste water by air stripping. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

Listed as a RCRA Hazardous Waste (40 CFR 261.33): U122
Listed as a SARA Toxic Chemical (40 CFR 372.65)
Listed as a SARA Extremely Hazardous Substance (40 CFR 355), TPQ: 500 lb
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 100 lb (45.4 kg) [* per RCRA, Sec. 3001]

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)
Listed as an OSHA Specifically Regulated Substance (29 CFR 1910.1048)
Listed as a Process Safety Hazardous Chemical (29 CFR 1910.119)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For any detectable level, use any SCBA with a full facepiece operated in pressure-demand or other positive pressure mode. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. **Warning!** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear chemically protective gloves, boots, aprons, and gauntlets to prevent skin contact. Polyethylene and fluorocarbon, butyl, and nitrile rubbers with breakthrough times of > 8 hr are suitable materials for PPE. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PEL (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰⁰⁾ **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes and launder before reuse. Remove this material from your shoes and clean PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store liquid (formalin) in a dry, well ventilated area. Minimum storage temperatures to prevent polymerization are 83 °F (37% solution with 0.05% methanol) and 29 °F (solutions with 15% methanol). Inhibiting polymerization with methanol decreases the minimum storage temperature by 2.3 °C per wt.% methanol added. Keep anhydrous (gaseous) formaldehyde at 80 to 100 °C because it slowly polymerizes at lower temps. Check inhibitor levels regularly. Indoor storage areas should have floors that slant towards a drain or curbed retention areas. Store in 304, 316, and 347-type stainless steel or lined carbon steel containers. Separate from oxidizers, alkalies, acids, and amines. Install Class I, Group B electrical equipment. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. **Administrative Controls:** Consider preplacement and periodic medical exams of exposed workers.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Formaldehyde solutions; Formaldehyde solutions, flammable

DOT Hazard Class: 9, 3

ID No.: UN2209, UN1198

DOT Packing Group: III

DOT Label: None, Flammable Liquid

Special Provisions (172.102): T1; B1, T8

Packaging Authorizations

a) Exceptions: 173.155, 173.150

b) Non-bulk Packaging: 173.204, 173.203

c) Bulk Packaging: 173.240, 173.242

Quantity Limitations

a) Passenger Aircraft or Railcar: 100 L, 60 L

b) Cargo Aircraft Only: 220 L

Vessel Stowage Requirements

a) Vessel Stowage: A

b) Other: —, 40

MSDS Collection References: 26, 73, 100, 101, 103, 124, 126, 127, 132, 133, 136, 139, 140, 148, 149, 153, 159, 162, 163, 164, 167, 168, 169, 171, 174, 175

Prepared by: M Gannon, BA; **Industrial Hygiene Review:** D Wilson, CIH; **Medical Review:** W Silverman, MD

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MSDS - 354489

GE Plastics

MATERIAL SAFETY DATA SHEET

STYRENE

PRODUCT # 15

01/01/94 PAGE 01/04

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

MANUFACTURER / SUPPLIER

General Electric Company
5th & Avery Streets
Parkersburg, WV 26102

EMERGENCY TELEPHONE

(800) 447-4545 (24 hour)
(504) 642-5454 (24 hour)

Medical
Other

NON-EMERGENCY TELEPHONE

(800) 872-0022

PRODUCT IDENTIFIER:
PRODUCT DESCRIPTION:
PRODUCT USE:

STYRENE
Styrene (CAS# 100-42-5).
Intermediate material for use in manufacturing
surfactants, polymers, and stabilizers.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Additional compositional data are provided in the REGULATORY INFORMATION section for WHMIS, SARA 313, California Proposition 65 and various state right-to-know laws.

CAS NUMBER	OSHA	UNITS	ACGIH	UNITS
CHEMICAL NAME				
100-42-5				
styrene				
	50.0	ppm PEL	50.0	ppm TLV
	100.0	ppm STEL	100.0	ppm STEL

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Liquid material with a slight aromatic odor.
Can burn in a fire creating dense toxic smoke.

POTENTIAL HEALTH EFFECTS

EYE:

May cause moderate irritation.

SKIN:

Product may cause skin irritation and sensitization.

INGESTION:

Not acutely toxic.

INHALATION:

May be irritating to the respiratory tract.

CHRONIC/CARCINOGENICITY

NTP:

Not Tested.

OSHA:

Regulated

IARC:

Group 2B: (Possibly carcinogenic to humans)

MEDICAL RESTRICTIONS:

Certain skin sensitive individuals and
individuals with respiratory impairments may be affected by exposure to this
product.

4. FIRST AID MEASURES

EYES:

Remove contact lenses at once. Immediately
flush eyes well with copious quantities of water or normal saline for at
least 20-30 minutes. Seek medical attention.

SKIN:

Immediately wash with soap and water for at
least 15 minutes. If irritation develops, seek medical attention. Remove
contaminated clothing immediately.

INGESTION:

Seek immediate medical attention.

INHALATION:

If inhaled, move victim to fresh air and
immediately seek medical attention.

FIRE FIGHTING: Approved pressure demand breathing apparatus and protective clothing should be used for all fires. Use extinguishing water stream carefully and contain runoff.

EXTINGUISHING MEDIA: Dry chemical, foam, water spray, carbon dioxide.

HAZARDOUS COMBUSTION PRODUCTS: Hazardous combustion products may include intense heat, dense black smoke, carbon monoxide, carbon dioxide and hydrocarbon fragments.

FLASH POINT: 31C (88F)

LOWER FLAMMABLE LIMIT: 6.1

UPPER FLAMMABLE LIMIT: 1.1

AUTOIGNITION: 490C (914F)

CONDITIONS OF FLAMMABILITY: The liquid and vapor are easily ignited by spark or continuous flame and are extremely flammable.

EXPLOSION DATA

IMPACT SENSITIVITY: Not sensitive to mechanical impact.

STATIC DISCHARGE: Sensitive to static discharge.

6. ACCIDENTAL RELEASE MEASURES

GENERAL: Contain spill and use absorbent where necessary. Transfer to proper containers for disposal. (SEE DISPOSAL INFORMATION.)

7. HANDLING AND STORAGE

HANDLING: Follow recommendations on label and in product guide. Prevent contact with skin and eyes. Use good industrial hygiene practices. Provide adequate ventilation. Use aggressive housekeeping activities to prevent material accumulation; employ bonding, grounding, venting and explosion relief provisions in accord with accepted engineering practices.

STORAGE: Store in a dry place away from moisture, excessive heat and sources of ignition. Avoid storage near foods to prevent food contamination.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Ventilation requirements must be locally determined to limit exposure to processing fumes in the workplace. Design techniques and guidelines may be found in publications such as:

Industrial Ventilation; available from the American Conference of Governmental Industrial Hygienists, Committee on Industrial Ventilation, P.O. Box 16153, Lansing, MI 48901.

PERSONAL PROTECTION

EYE/FACE: Wear safety glasses with side shields or chemical goggles.

SKIN: When handling avoid contact with skin. Use appropriate protective clothing, including chemical resistant gloves.

RESPIRATORY: When exposures are not adequately controlled, use respirator approved for protection from organic vapors.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: Liquid

ODOR AND APPEARANCE: Clear, oil liquid with aromatic odor.

BOILING POINT: 145C (292F)

MELTING POINT: -30C (-23F)

VAPOR PRESSURE (mmHg): 4.5 MMHG @ 20C

VAPOR DENSITY (air=1): 3.5

SPECIFIC GRAVITY (water=1): 0.90 - 0.92

WATER SOLUBILITY: 0.032% by weight

% VOLATILES: Not Established

pH: Not Applicable

ODOR THRESHOLD: Approximately 1 ppm

EVAPORATION RATE: 0.49 (Butyl Acetate=1)

COEFFICIENT WATER/OIL DISTR: Not Established

10. STABILITY AND REACTIVITY

STABILITY: Stable under recommended conditions of storage and handling.

REACTIVITY: Hazardous polymerization possible with heat, catalyst and low concentration of inhibitor.

CONDITIONS TO AVOID: Avoid strong oxidizing agents, chlorine and fluorine. Avoid exposure to heat, light, flame, or other sources of ignition. Polymerizes easily; store below 32C (90F) and maintain inhibitor and dissolved oxygen level.

HAZARDOUS DECOMPOSITION: May include trace levels of ethylbenzene and benzene.

11. TOXICOLOGICAL INFORMATION

PRODUCT:

EYE: Styrene is an irritant of the eyes and mucous membranes.

SKIN: Causes skin irritation. Can produce dermatitis upon prolonged or repeated contact.

ACUTE ORAL: Oral LD50 (Rat) 5 g/kg.

ACUTE INHALATION: Inhalation of vapors can cause respiratory irritation, drowsiness, memory loss, dizziness, and loss of coordination. Some animal studies have indicated that inhalation of high concentrations can produce mild liver damage, although other studies have shown no such effect.

CHRONIC: Nine long-term animal studies provide no clear evidence of a carcinogenic response related to styrene. Human studies have also failed to demonstrate an increased human cancer risk from styrene exposure. IARC concluded the evidence for carcinogen was inadequate and that the evidence for carcinogen in animals was limited. IARC classifies styrene as a possible human carcinogen. Exposures to extremely high levels of styrene produce hearing loss in rats.

12. ECOLOGICAL INFORMATION

GENERAL: The aquatic toxicity of this product has not been determined. Therefore, avoid discharge to all bodies of water.

13. DISPOSAL INFORMATION

RCRA HAZARDOUS WASTE: D-001

WASTE DISPOSAL: Incinerate in accordance with federal, state and local requirements.

14. TRANSPORTATION INFORMATION

DOT HAZARD CLASS: Flammable liquid

PROPER SHIPPING NAME: Styrene monomer, inhibited.

IDENTIFICATION NUMBER: UN2055

TDGA: Regulated

15. REGULATORY INFORMATION

Listed below are chemical substances subject to supplier notification requirements. The percentages, when present, represent average values.

CAS NUMBER	SARA	WHMIS	CA-65	FL	RI
CHEMICAL NAME	313,%	%	%		
100-42-5	99.9	99.9		X	X
styrene					

TSCA STATUS: This product complies with the Chemical Substance Inventory requirements of the US EPA Toxic Substances Control Act (TSCA).

WHMIS CLASSIFICATION: D2

16. OTHER

PREPARED BY: Product Compliance

The above information and recommendations are believed accurate and reliable. Because it is not possible to anticipate all conditions of use additional

safety precautions may be required. GENERAL ELECTRIC COMPANY makes no warranty, either express or implied, including merchantability and fitness. USER RESPONSIBILITY: Each user should read and understand this information and incorporate it into individual site safety programs in accordance with applicable hazard communication standards and regulations.

REVISIONS IN THIS MSDS SINCE YOUR LAST ORDER ARE IN THE FOLLOWING SECTION(S):

- 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
- 15. REGULATORY INFORMATION
- 16. OTHER

APPENDIX C

SAFE LIFTING PROCEDURE



OHM Corporation

HEALTH & SAFETY PROCEDURES

PERSONAL LIFTING SAFETY

PROCEDURE NUMBER 33

Page 1 of 2

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

All OHM Remediation Services Corp. (OHM) employees will use the proper lifting techniques and will utilize mechanical means when an objects' weight or bulk cannot be safely lifted by manual means.

2. PURPOSE

This procedure provides the proper lifting technique to be used by OHM employees. By utilizing proper technique, OHM employees can avoid debilitating lower back injuries.

3. REQUIREMENTS

- 3.1 Use mechanical material handling equipment whenever practical; however, mechanical lifting equipment shall be used only by qualified personnel.
- 3.2 If the material must be lifted manually, the following procedures apply:
 - 3.2.1 Make certain that the load lifted can be safely handled. Consider the size, weight, and shape of the load. If necessary, get help.
 - 3.2.2 Warm up for the lift by bending, stretching, and turning.
 - 3.2.3 Do not attempt to lift more than 60 pounds.
 - 3.2.4 Ensure proper lifting technique as follows.
 - Place feet about shoulder width apart.
 - Place one foot alongside the object being lifted and the other foot in front of the object.
 - Bend at the knees to grasp the load.
 - Maintain slight arch in the back when positioning over load.
 - Draw the load close to the body, keeping the arms and elbows tucked into the side of the body.

- Take a firm hold on the load with the palms of the hands, not just the fingers.
- Maintain same slight arch in the back.
- Lift gradually, using your leg muscles. Make sure you draw the load close to your body.
- Do not twist the body when lifting. If you have to change direction, turn with your feet, not your trunk.
- Carry the object close to the body and watch where you are going. Do not carry objects in a manner that obstructs your vision.
- Avoid throwing or dropping objects. When lowering, maintain a firm grip. Watch out for pinching of the fingers. Use your leg muscles to lower the object by bending at the knees and keeping your back straight.

- Non-operators must remain a safe distance from the operator. The distance must be a minimum of 25 feet.
- The operating pressure should never exceed that which is necessary to complete the job.
- No unauthorized attachment may be made to the unit. (The trigger should never be tied down.)
- The operator should be changed at frequent intervals to avoid fatigue (at least hourly).
- Equipment should be cleaned often to avoid oil or dirt build-up, especially around the trigger and guard area.
- An assistant should always be standing by at the pressure generator to shut down the equipment and monitor the pressure.
- All users must be trained in emergency shut down procedures and general equipment maintenance.
- All lances must be made of seamless stainless steel. Do not use carbon steel which can corrode and result in weakening of the lance.
- DO NOT MODIFY THE LANCE. The lance barrel, from trigger block to the tip, should not be less than 48 inches as recommended by manufacturers of hydroblasting equipment.
- Always increase pressure slowly to inspect for leaks. All leaks or malfunctioning equipment must be repaired immediately or the unit taken out-of-service. Never exceed the operating pressure necessary to do the job.
- Attach a cable which connects the water supply hose to the laser wand to prevent whipping should they accidentally disconnect.
- A serious risk of infection and further complications is possible from a hydroblasting laceration. If an injection injury is suspected, the treating physician should be informed so he/she can request a surgeon who specializes in injection injuries. The specialist may have to perform surgery on the affected body part in order to remove the material (oil, particles) that was injected directly through the skin.

APPENDIX D

PRESSURE-WASHING PROCEDURE



OHM Corporation

HEALTH & SAFETY PROCEDURES

HIGH PRESSURE WASHERS

PROCEDURE NUMBER 30

Page 1 of 2

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) personnel who have been trained in the proper set-up, use, and care of high pressure washers will be authorized to operate this equipment.

2. PURPOSE

This procedure describes requirements for the safe operation of the high-pressure washer.

3. PERSONAL PROTECTIVE EQUIPMENT

The following equipment will be worn by operators and assistants:

- Safety shoes or boots
- Metal foot and shin guards
- Eye protection (goggles and face shield)
- Hard hat
- Heavy duty PVC rain suit or equivalent
- Heavy chemical resistant gloves

4. OPERATION PROCEDURE

- Only trained, authorized personnel will operate the high-pressure washer.
- The lance must always be pointed at the work area.
- The operator must maintain good footing.
- The operator must have an assistant to aid in moving the hose to different areas and backing up the operator. The assistant must remain in back of the operator.

- Non-operators must remain a safe distance from the operator. The distance must be a minimum of 25 feet.
- The operating pressure should never exceed that which is necessary to complete the job.
- No unauthorized attachment may be made to the unit. (The trigger should never be tied down.)
- The operator should be changed at frequent intervals to avoid fatigue (at least hourly).
- Equipment should be cleaned often to avoid oil or dirt build-up, especially around the trigger and guard area.
- An assistant should always be standing by at the pressure generator to shut down the equipment and monitor the pressure.
- All users must be trained in emergency shut down procedures and general equipment maintenance.
- All lances must be made of seamless stainless steel. Do not use carbon steel which can corrode and result in weakening of the lance.
- **DO NOT MODIFY THE LANCE.** The lance barrel, from trigger block to the tip, should not be less than 48 inches as recommended by manufacturers of hydroblasting equipment.
- Always increase pressure slowly to inspect for leaks. All leaks or malfunctioning equipment must be repaired immediately or the unit taken out-of-service. Never exceed the operating pressure necessary to do the job.
- Attach a cable which connects the water supply hose to the laser wand to prevent whipping should they accidentally disconnect.
- A serious risk of infection and further complications is possible from a hydroblasting laceration. If an injection injury is suspected, the treating physician should be informed so he/she can request a surgeon who specializes in injection injuries. The specialist may have to perform surgery on the affected body part in order to remove the material (oil, particles) that was injected directly through the skin.

APPENDIX E

LOCKOUT/TAGOUT PROCEDURE



OHM Corporation

HEALTH & SAFETY PROCEDURES

LOCKOUT/TAGOUT

PROCEDURE NUMBER 27

Page 1 of 3

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

This procedure shall be used by OHM Remediation Services Corp. (OHM) personnel to ensure that the machine or equipment being worked on is isolated from all potential hazardous energy sources, and locked out or tagged out before an employee performs any servicing or maintenance activity where that unexpected energization, start-up or release of energy could cause an injury. Energy sources can be electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

2. PURPOSE

This procedure establishes the minimum safety requirements to ensure the proper deactivation of movable, electrically energized, pressurized equipment and systems, and systems containing hazardous materials prior to repairing, cleaning, oiling, adjusting, or similar work. This procedure complies with the requirements in 29 CFR 1910.147.

3. REQUIREMENTS

This procedure applies to all equipment that receives energy from electrical power, hydraulic fluid under pressure, compressed air, steam, energy stored in springs, potential energy from suspended parts, or any other source that may cause unexpected movement when it is necessary to perform work on that system. It also applies to similar functions performed on systems containing hazardous materials.

4. DEFINITIONS

- 4.1 Lockout - The placement of a lockout device on an energy isolating device, in accordance with this procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed. The lockout device can be key operated or a combination device.
- 4.2 Tagout - The placement of a tagout device on an energy isolating device, in accordance with this procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed by the authorized person who originally placed the tagout device in position.

- 4.3 Authorized employee. A person who locks or implements a tagout system procedure on machines or equipment to perform the servicing or maintenance on that machine or equipment.

5. PROGRAM ELEMENTS

Prior to initiating any repairs, modifications and/or adjustments to operating equipment, these steps will be followed.

- 5.1 The immediate supervisor with jurisdiction over the equipment and all affected employees will be notified that the energy sources are to be deactivated.
- 5.2 All sources of power that must be locked out, blocked or released will be identified by the immediate Supervisor and the employee who will work on the equipment.
- 5.3 In order to ensure that the equipment cannot be re-energized while maintenance activities are performed, the employee will lockout / blank out all potential energy sources. (The employees will be assigned padlocks with their names or identification numbers affixed to the locks. The locks will be individually keyed to prevent another employee from removing the lock inadvertently.) If more than one employee is assigned to work on the equipment, a multi-lockout hasp will be used so that all employees working on the equipment can apply their locks and ensure their safety.
- 5.4 A tagout device will be affixed to all components or systems de-energized to indicate that lockout has been performed.

Prior to performing any work activities, the employee will operate the start and stop controls on the equipment to ensure that the equipment has been properly deactivated. After the test, the equipment must be in neutral or off.

- 5.5 After the servicing and/or maintenance is complete and the equipment is ready for normal operations, check the area around the machine or equipment. After all tools have been removed from the machine or equipment, guards have been reinstalled, remove all lockout or tagout devices. Operate the energy isolating devices to restore energy to the machine or equipment.

6. SPECIAL CONDITIONS

During certain operations it may be necessary to energize the equipment for a short period of time. Employees in the immediate area will be notified and directed to stay clear of the equipment. If the operation is to be deactivated again, the employee should repeat steps 5.3 to 5.6 of this procedure before work resumes.

In some instances work will carry over to another shift. The maintenance supervisor shall affix a department lock to the equipment to ensure that it is not energized during the transition. During subsequent slight operations, employees will ensure that steps 5.2 to 5.6 are complete before work resumes on the equipment.

If the work is completed and a lock remains on the equipment, it shall not be removed until the employee responsible for the lock is found or the supervisor of the employee investigates and ascertains that the equipment is safe to operate. Unauthorized removal of a lock will subject the violator to disciplinary action up to dismissal.

7. TRAINING

Initial and annual training will be given to all employees to ensure that the purpose and function of this energy and control program are understood.

8. PERIODIC INSPECTION

Corporate health and safety will conduct an annual audit of the energy control program to ensure that the requirements of their procedures are being followed. A record of annual audits will be kept to comply with the certification requirement of periodic inspections.

APPENDIX F

HOT WORK PROCEDURE/PERMIT



OHM Corporation

HEALTH & SAFETY PROCEDURES

HOT WORK

PROCEDURE NUMBER 26

Page 1 of 5

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) personnel performing hot work outside of rooms specifically designed for spark producing operations such as welding are required to obtain a hot work permit and comply with all provisions described in the permit.

2. PURPOSE

This procedure establishes requirements for cutting or burning operations performed at OHM Remediation Services Corp. (OHM) project sites in accordance with 29 CFR 1910.252 (d)(2)(iv) and .252 (d)(xiii)(b).

3. REQUIREMENTS

3.1 The site safety officer (SSO) or other qualified person will issue the hot work permit for any flame or spark producing operation that requires such a permit. This procedure is to be repeated for each shift when such operations occur.

3.2.1 Conduct a visual inspection of area. Remove any combustible material surrounding the work area for a minimum of 50 feet. Special attention will be paid to areas where hot slag can fall or spatter. Any combustible material which cannot be readily removed will be covered or otherwise protected from the hot materials. For example, covering a combustible surface with one inch of soil or wetting it may be sufficient.

3.2.2 Designate a fire watch. This person's (or persons') sole responsibility will be to monitor the welding or burning operation and have immediate access to a fire extinguisher of sufficient size and type for the potential combustible material. In addition, this person(s) shall be trained in the proper use of the appropriate fire extinguisher and be knowledgeable of the emergency signal and evacuation procedures as well as emergency shutdown procedures.

- 3.2.3 A qualified person must test the atmosphere. Do not begin until all spaces, pipes, and sumps affected have been opened and tested for the presence of flammables. If any flammable or combustible vapors exceed 10 percent lower explosive limit (LEL), no work will begin until levels are reduced. As a rule, no hot work will begin when any combustible vapor is present. All sewers in the vicinity of the hot work must be covered.
- 3.2.4 Notify personnel. Personnel working in the area of the hot work will be alerted to the fact that hot work is taking place.
- 3.2.5 Complete a hot work permit. A hot work permit will be completed and posted. The OHM Hot Work Permit follows this procedure.

4. BURNING OPERATION SAFETY RULES

- 4.1 Wear adequate flame and heat resistant clothing and appropriate eye protection. This includes chipping operations.
- 4.2 Ensure that the area below is roped off and posted if work is overhead.
- 4.3 Protect personnel and equipment in near vicinity against exposure from arc or sparks.
- 4.4 Observe good housekeeping practices; keep excess hoses, cables, and equipment out of aisle ways, stairways, and your work station.
- 4.5 Never use oil, grease, or pipe fitting compounds to make up connections on oxy-acetylene welding equipment.
- 4.6 Store torch fittings in a manner to prevent contamination.
- 4.7 Do not interchange oxygen and acetylene hoses; oxygen is coded green and acetylene is coded red.
- 4.8 Do not force connections or strike or force valve wheels.
 - 4.8.1 Before connecting cylinders, read the label to ensure that the proper gas is being used.
 - 4.8.2 Cylinders must not be placed where they might form part of an electrical circuit. Keep cylinders away from grating, layout tables and piping systems that may be used for the grounding or electrical welding circuits.

- 4.9 Open oxygen valves momentarily to remove dust or dirt; stand on one side of the valve and avoid contact of gas with any combustible material.
 - 4.9.1 Pressure-adjusting screws on regulators will be fully released before the regulator is attached to a cylinder and the cylinder valve opened. Open the cylinder valve slowly; stand to one side, not in front of pressure regulator gauge faces when opening cylinder valves.
 - 4.9.2 Do not use adjustable wrenches on acetylene cylinders; use the T-wrench provided. Keep it in place at the cylinder.
 - 4.9.3 Never open an acetylene cylinder valve more than one and one half turns.
- 4.10 Do not store tools or equipment in the recessed top of an acetylene cylinder, and do not allow water to accumulate there.
- 4.11 Inspect the welding hose for defects before each use. Keep hoses clear of equipment and hot slag.
- 4.12 Do not use oxygen for cleaning, pressurization, or for ventilation.
- 4.13 Do not relight the flame on hot work when in an enclosed space. Allow time for gases to escape and then use a friction lighter.
- 4.14 A metal part which is suspiciously light probably has a void inside and an opening should be drilled before heating. Electrical boxes at the end of a conduit should be opened prior to cutting the conduit. Valves on both ends of piping should be opened.
- 4.15 Never lay work that is to be heated or welded on a concrete floor because when sufficiently heated, concrete may spall and fly with danger of injury.
- 4.16 Do not cut material in such a position that severed parts will fall striking legs or feet of the operator or assistant, or damage gas lines.
- 4.17 When a flashback occurs, both gases should be shut off - first oxygen, then acetylene. Before lighting the torch again, see that it is cool and that no damage has been done to the torch, hose, or regulator.
- 4.18 Mark work "HOT" if left unattended or where others may come in contact with hot surfaces.

- 4.19 When burning operations are to be stopped for a few minutes during the course of the work, it is permitted to close torch valves only. When work is stopped for a longer period, (5 minutes) or is left unattended, the following steps must be taken:
 - 4.19.1 Close oxygen and acetylene cylinder valves
 - 4.19.2 Open torch valves to relieve pressure, then close again
 - 4.19.3 Release regulator pressure adjusting screws
- 4.20 Before regulator is removed from a cylinder, the cylinder valve will be closed and the gas released from the regulator.
- 4.21 Back flow protection shall be provided by an approved device that will protect O₂ from flowing into the fuel-gas system or fuel-gas from flowing into the O₂ systems.

5. PERSONAL PROTECTIVE EQUIPMENT

The normal personal protective equipment worn when working generally provides inadequate protection from flames or heat. The person performing the work shall supplement the existing equipment with the following:

- 5.1 Welding gloves fashioned from leather or other fire-resistant material
- 5.2 Apron or jacket fashioned from leather or other fire-resistant material
- 5.3 Chaps, if necessary, for leg protection
- 5.4 Eye protection and face protection with appropriate ANSI approved darkened lenses
- 5.5 If necessary, flash-fire protection.
- 5.6 Respiratory protection must be used during hot work that will produce fumes and gases hazardous to health. Such gases and fumes may be caused by the filling agent or material being worked on.

6. TRAINING

- 6.1 Employees designated to operate welding equipment shall have been properly instructed and judged competent to operate such equipment.

7. OHM HOT WORK PERMIT

- 7.1** No employee or subcontractor of OHM is to begin hot work unless an OHM Hot Work Permit has been requested and provided. It is the responsibility of the supervisor to make the determination if a permit is required. The permit shall be signed by the Site Supervisor or SSO and explained to each affected employee.
- 7.2** It is the responsibility of the Site Supervisor to see that workers comply with all safety practices of the OHM Hot Work Permit.
- 7.3** The permit will be valid for a single work shift only. For work requiring more than a single work shift, a new permit shall be completed at the start of each shift. The permit shall be displayed at the work site.
- 7.4** At the conclusion of the work, permits will be placed in the project file.



OHM Corporation

HOT WORK PERMIT

Date: _____ Time: _____

Project Name: _____ Project Number: _____

Location: _____

Issued to: _____

Site Safety Officer: _____

Supervisor: _____

Do not cut or use other open-flame or spark producing equipment until the following precautions have been taken.

Protective Equipment used: _____

(Initial Each Item)

- _____ The location where the work is to be done has been personally examined.
- _____ Any available fire protection systems are in service.
- _____ There are no flammable dusts, vapors, liquids, or unpurged tanks (empty) in the area.
- _____ Explosimeter reading < 10% LEL
- _____ All combustibles have been moved away from the operation, or otherwise protected with fire curtains or equivalent.
- _____ Ample portable fire extinguishing equipment has been provided.
- _____ Arrangements have been made to patrol the area for a least ½ hour after the work has been completed.
- _____ The phone number for the local Fire Department is: _____

This form must be filled out daily whenever HOT WORK is being conducted and posted at the job site.

APPENDIX G

CONFINED SPACE ENTRY PROCEDURE



OHM Corporation

HEALTH & SAFETY PROCEDURES

CONFINED SPACE ENTRY

PROCEDURE NUMBER 24

Page 1 of 5

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) shall enforce this procedure as a means of protecting the health and safety of workers while entering, working in, and exiting confined spaces. Before entry, the worker will be made aware of the hazards of confined space work and the safe work practices necessary.

2. PURPOSE

The purpose of this procedure is to establish confined space entry standards for all OHM employees. This procedure meets and exceeds the guidelines in the Occupational Safety and Health Administration (OSHA) proposed Confined Space Entry standard 29 CFR 1910.146.

3. PROCEDURE

3.1 Permitting - All "permit required confined space" entries will be proceeded by the completion of a confined space entry permit. The OHM confined space entry permit follows this procedure.

3.2 Written Rescue Procedure - Prior to any confined space work, a site specific written rescue plan will be developed that addresses minimum requirements.

3.2.1 Rescue

- The equipment required to rescue an unconscious victim must be in-place before the first person enters the confined space.
- A trained stand-by person will be assigned to each confined space with a fully charged SCBA or airline and egress unit.
- The stand-by is to keep life lines clear, to maintain contact with all workers within the confined space and to summon help if needed.
- The stand-by must never enter the confined space unless relieved by rescue assistance.
- The stand-by may attempt rescue by lifeline while waiting for rescue assistance.

4. PERMIT SYSTEM

All confined space entry permits will address the following:

- Location
- Hazards-Isolation
- Lockout / Tagout
- PPE and special equipment
- Air monitoring requirements and results of such monitoring
- Personal monitoring
- Training required
- Stand-by persons to be present as alternates
- Communication procedures
- Emergency / rescue procedures
- Confined space classification
- Posting of notification

6. TRAINING

OHM will train employees involved in confined space entry and confined space rescue on the hazards associated with confined space work. This training will, as a minimum, cover the following:

- Hazard recognition
- Emergency entry and exit
- Respirator use
- First aid
- Lock-out procedures
- Safety equipment
- Rescue drills
- Permit system
- Work practices
- Communication requirements

7. TESTING AND MONITORING

- 7.1 Initial Monitoring - Entry into a confined space is prohibited until initial testing of the atmosphere for oxygen content and toxic gas concentration is conducted from the outside. Initial monitoring gives critical information concerning oxygen level, flammability and toxicity hazards.

- 7.2 Hot Work - All hot work is prohibited in confined space where monitoring indicates that there are flammable compounds in excess of 10% of the Lower Explosive Limit (LEL). The monitoring device will be intrinsically safe for flammable atmospheres or explosion proof. If hot work must be performed in the confined space, a hot work permit must be completed. Cutting gas cylinders and welding machines will not be taken into confined space.
- 7.3 Calibration - All monitoring equipment will be calibrated before each use and those calibrations will be logged in the equipment records. The calibration record will be kept for a minimum of one year from the date of measurement.
- 7.4 Oxygen Requirement - The percent oxygen for entry will not be less than 19.5% for confined space entry without supplied air respirators. If elevated (greater than 22%) oxygen levels are detected, the confined space must be ventilated prior to any "hot work". Any oxygen reading above or below 20.9% will be reported to the site safety officer before further entry is attempted.
- 7.5 Permissible Exposure Limits (PEL) - OHM employees will be provided with and will be required to properly use protective clothing and respiratory protective equipment when contaminants in the atmosphere reach or exceed the PEL. The personal protective equipment (PPE) selected will reduce exposure to contaminants to acceptable levels.

8. LABELING AND POSTING

- 8.1 Any signs warning of dangers in the work area will be in English and the predominant language of any non-English reading workers.
- 8.2 All entrances to confined spaces at OHM facilities and on-going projects will have appropriate signs posted. The signs should include the following, if applicable:

**Danger
Confined Space Entry
Entry by Permit Only**

The following statements shall be added where necessary:

**Respirator Required for Entry
Lifeline Required for Entry
Hot Work Permitted
or
No Hot Work**

- 8.3 Emergency numbers will be conspicuously posted near the work area or at the telephone nearest the work area.

9. SAFETY EQUIPMENT AND PPE

The site safety officer or site supervisor will determine and list on the confined space permit the necessary safety equipment and PPE. The site supervisor will ensure that the safety equipment is properly used and is maintained in the proper working condition. These items may include, but are not limited to:

- Eye / face protection
- Head protection
- Foot protection
- Protective clothing
- Hearing protection
- Respiratory protection
- Safety bells/Alarms
- Harnesses
- Lifelines
- Wrist harnesses
- Life jackets
- Fall nets
- Barricades
- Retrieval systems

10. WORK PRACTICES

- 10.1 Purge and Ventilation - During purge and ventilation procedures, blower controls will be a safe distance from the confined space. Initial testing is to be conducted prior to purge/ventilation to determine what precautions are necessary. If a flammable atmosphere exists, all electrical equipment must be intrinsically safe or explosion proof. Continuous ventilation will be required when welding or painting in a confined space, or where a toxic atmosphere may form from desorption from walls, or evaporation of chemicals. Ventilation systems must not prevent egress from the area or interfere with communications.
- 10.2 Isolation / Lock-out / Tag-out - Each confined space will have isolation procedures specifically developed. The confined space must be completely isolated from all systems by physical disconnect, block and bleed, or blanking and tagging. Electrical systems must be de-energized and locked-out. All systems should be checked for stored energy before any entry into confined space is attempted.

- 10.3 Cleaning - Cleaning procedures will be reviewed and approved by the qualified person. Initial cleaning will be conducted from outside the tank whenever possible to minimize exposures to employees. Cleaning may be accomplished by flushing with water or chemical cleaners. At times the use of a "Butterworth" cleaning head may be required. In any case, gross material must be removed before entry is performed.

11. EQUIPMENT AND TOOLS

All equipment that is used in confined space will be inspected and as a minimum, will meet the following requirements:

- Hand tools will be kept clean and in proper working condition.
- Electric tools, equipment and lighting will be intrinsically safe or explosion proof for flammable atmospheres and be equipped with ground fault circuits interrupters (GFCI).
- Extension cords will be industrial quality, 3 wire and 12 gauge as a minimum.
- Cylinders of compressed gas will never be taken into a confined space, with the exception of SCBA tanks or life saving equipment.
- Ladder and scaffolding will meet or exceed OSHA requirements in 29 CFR 1910.25-28.



OHM Corporation

CONFINED SPACE ENTRY PERMIT

Project No. _____

Permit No. _____

Good on this Date Only: _____

a.m. _____
p.m. _____

From: _____ To: _____

Location: _____

Description of Task: _____

Workers Authorized to Enter	Work Monitors	Rescue Personnel
_____	_____	_____
_____	_____	_____
_____	_____	_____

EMPLOYEE PRE-ENTRY BRIEFING

Pre-Entry Briefing Conducted by: _____ (Name) _____ (Date)

CONFINED SPACE PREPARATION

1. Is Illumination Adequate?	YES _____	NO _____	
2. Must Electrical Devices be Intrinsically Safe or Explosion Proof?	YES _____	NO _____	
3. Are Non-Sparking Tools Required?	YES _____	NO _____	
4. Are GFCI's In Use?	YES _____	NO _____	
5. Have All Power Cords and Tools Been Visually Inspected?	YES _____	NO _____	N/A _____
6. Fire Extinguisher Available at Entrance.	YES _____	NO _____	TYPE _____
7. Eye Wash/Safety Shower Available.	YES _____	NO _____	N/A _____
8. Is Rescue SCBA Available?	YES _____	NO _____	N/A _____
9. Work Area Isolated with Signs/Barriers?	YES _____	NO _____	N/A _____
10. All Energy Sources Locked/Tagged Out?	YES _____	NO _____	N/A _____
11. All Input Lines Capped/Blinded?	YES _____	NO _____	N/A _____
12. Vessel Contents Drained/Flushed/Neutralized?	YES _____	NO _____	N/A _____
13. Vessel Cleaned/Purged?	YES _____	NO _____	N/A _____
14. Ventilation Provided 30 Minutes Before Entry?	YES _____	NO _____	N/A _____
15. Communication Requirements	VISUAL _____	VOICE _____	RADIO _____
16. Level of Respiratory Protection.	B _____	C _____	D _____
17. Type of Chemical Protective Clothing Required.	TYVEK _____	SARAN _____	ACID _____
18. Type of Glove Material Required.	NITRILE _____	PVC _____	ACID _____

PRE-ENTRY ATMOSPHERIC TESTING

1. Test for Oxygen Content:	Reading: _____ % O ₂	Time: _____	Initials: _____
2. Test for Flammable Concentration:	_____ % LEL	_____	_____
3. Test for Toxic Concentration:	_____ ppm of _____ (TLV = _____)	_____	_____
4. Continuous Monitoring Required?	YES _____ NO _____	_____	_____

EMERGENCY/RESCUE PROCEDURES

1. Is a Site Specific Rescue Plan Required?	YES _____	NO _____	
2. Are Personnel Trained for Confined Space Rescue Available?	YES _____	NO _____	
3. If NO, Has an Outside Agency Been Notified?	YES _____	NO _____	
4. Outside Rescue Agency Name: _____			Phone No. _____

ENTRY/EGRESS REQUIREMENTS

1. Are Ladders Required for Entry?	YES _____	NO _____	
2. Are Vertical Extraction/Rescue Devices Required?	YES _____	NO _____	
3. Is Fall Protection Required?	YES _____	NO _____	

OTHER POTENTIAL HAZARDS

1. Noise	YES _____	NO _____	CONTROL _____
2. Heat Stress	YES _____	NO _____	CONTROL _____
3. Cold Stress	YES _____	NO _____	CONTROL _____
4. Biological Agents	YES _____	NO _____	CONTROL _____

SUBCONTRACTOR NOTIFICATION

Contractor Notified of: Permit Conditions _____ Potential Hazards _____ N/A _____

PERMIT AUTHORIZATION

I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

Permit Authorized by (Signature): _____

APPENDIX H

LADDERS AND MANLIFTS PROCEDURES



OHM Corporation

HEALTH & SAFETY PROCEDURES

LADDERS AND MANLIFTS

PROCEDURE NUMBER 37

Page 1 of 4

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

All portable ladders used by OHM Remediation Services Corp. (OHM) personnel must meet applicable OSHA requirements and American National Standards Institute (ANSI) standards. All elevated work platforms must also comply with OSHA and ANSI standards as well as this procedure.

2. PURPOSE

This procedure establishes criteria for the procurement, construction, care and use of portable ladders and work stands in order to ensure personnel safety under normal conditions of usage. This procedure is an overview of 29 CFR 1910.25 - .27.

3. CARE AND USE OF LADDERS

- 3.1 Only Type I "Industrial" wooden, fiberglass or metal ladders shall be used by OHM personnel.
- 3.2 Ladders should be inspected prior to use. Ladders which are defective should be tagged "out of service" and be repaired or destroyed.
- 3.3 Ladders must be tied off when in use.
- 3.4 Ladders are to be maintained in serviceable condition at all times. The joint between the steps and side rails must be tight, all hardware and fittings securely attached, and the movable parts must operate freely without binding or undue play.
- 3.5 Safety feet and other auxiliary equipment are to be kept in good condition to ensure proper performance.
- 3.6 Ladders shall be stored in such a manner as to provide ease of access or inspection, and to prevent danger of accident when withdrawing a ladder for use. Ladders are to be stored on racks designed to protect the ladder when not in use. These racks must have sufficient support points to prevent any possibility of excessive sagging.
- 3.7 When not in use, wood ladders shall be stored at a location where there is good ventilation, but where they will not be exposed to the elements.

- 3.8 Ladders carried on vehicles shall be adequately supported to avoid sagging and securely fastened in position to minimize chafing and the effects of road shocks.
- 3.9 Wood ladders shall be kept coated with a suitable protective material. Painting of wooden ladders is permissible provided a clear finish is used (steps should be painted with a clear non-slip finish).
- 3.10 Ladders are to be maintained in usable condition at all times. Hardware, fittings, and accessories must be checked frequently and kept in good working condition.
- 3.11 Ladders must not be placed in front of doors opening toward the ladder unless the door is blocked open, locked, or guarded.
- 3.12 Ladders must not be placed on boxes, barrels, or other unstable bases to obtain additional height.
- 3.13 Ladders with broken or missing steps, rungs, or cleats, broken side rails, or other faulty equipment are not to be used. Improvised repairs are prohibited.
- 3.14 Tops of ordinary step ladders are not to be used as steps.
- 3.15 A ladder is not to be used to gain access to a roof unless the top of the ladder extends at least three (3) feet above the point of support at eaves, gutter, or roof line.
- 3.16 The correct angle for using straight ladders is for the foot of the ladder to be placed from the wall a distance equal to one-fourth ($1/4$) the effective length of the ladder. (Effective length = length of ladder from base to point of support.)
- 3.17 On two-section extension ladders, the minimum overlap for the two sections is to be at least three (3) feet.
- 3.18 Personnel using ladders must:
- Face the ladder while working.
 - Work only within arm's length of the ladder.
 - Use both hands when ascending or descending.
 - Allow no other person on the ladder.
 - Use rope to raise or lower materials and tools.

- 3.19 A portable ladder is designed as a one-man working ladder based on a 200-pound load. The ladder base section is to be placed with a secure footing. Safety shoes of good substantial design are to be installed on all ladders.
- 3.20 Portable metal ladders or work platforms are not to be used in the vicinity of electrical circuits or in places where they may come in contact with them. They are to be legibly marked with signs reading "CAUTION - DO NOT USE NEAR ELECTRICAL EQUIPMENT" or equivalent wording.

4. MOBILE ELEVATED WORK PLATFORMS

- 4.1 Whenever a fork-lift is used to elevate employees for work positioning, a safe work platform having sufficient space to accommodate the employees and material being elevated, but having not less than 24-inch x 24-inch working space, is to be securely attached to the forks or mast in such a manner as to prevent tripping, slipping, or falling from the supports.
- The platform must be equipped with standard guardrail, with midrails on all open or exposed sides. Toeboards are to be installed if work is performed above where employees normally work or pass.
 - Where a clearance restriction or the nature of the work prohibits the use of guardrail, a safety harness with lanyard must be used. The lanyard is to be attached to a point located above and near the center of the platform.
 - An operator is to be at the controls of the fork-lift while employees are on the elevated platform.
 - The side of the platform nearest the mast frame truss shall be guarded. This guard shall consist of a substantial frame covered with 1/2 inch expanded metal, laminated safety glass, or equivalent providing effective guarding to a height of 7 feet.
- 4.2 If a fork-lift is to be operated under conditions which might expose the operator to danger from falling objects from the elevated work platform, the truck must be equipped with overhead protection.
- 4.3 Whenever elevating personnel, fork-lift operators must:
- Use a securely attached safety platform.
 - Make sure the lifting mechanism is operating smoothly.
 - Place mast vertical and never tilt forward or rearward when elevated.

- Place truck in neutral and set parking brake.
- Lift and lower smoothly and with caution.
- Watch for overhead obstructions.
- Keep hands and feet clear of controls other than those in use.
- Never travel with personnel on the work platform other than to make minor movements for final positioning of the platform.

- 4.4 For one-man type pneumatic or hydraulic lifts, means must be provided to render inoperative all operating controls other than those on the platform when the controls on the platform are being used. Only one set of controls is to be capable of being operated at one time.

Outriggers are to be used in all cases where such accessory controls are provided with the lift.

- 4.5 Guardrails are to be installed on all work platforms in excess of 30-inches in height. Toe-boards are to be provided if the height of the platform exceeds six (6) feet. Stairways (to platform) having four (4) risers or more are to be equipped with handrails. Handrails are not required if the platform is less than 30-inches high.

APPENDIX I

HEARING CONSERVATION PROGRAM



OHM Corporation

HEALTH & SAFETY PROCEDURES

HEARING CONSERVATION PROGRAM

PROCEDURE NUMBER 19

Page 1 of 6

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) will use engineering controls and/or personal protective equipment (PPE) to control the effects of noise exposure in excess of 85 dBA during an 8-hour workshift.

2. PURPOSE

This procedure reflects the requirements of 29 CFR 1910.95 for the protection of personnel from the harmful effects of noise. All workers receiving noise exposures at or above the 85 dBA action level are to be included in a hearing conservation program. The OHM program consists of five basic components: exposure monitoring, audiometric testing, hearing protection, employee training, and record keeping. The requirements of the program are primarily performance oriented, allowing OHM to use judgement in selecting the best methods of compliance.

3. GENERAL INFORMATION

Exposure to excessively loud noise for extended periods of time can cause loss of hearing. High noise levels can induce more damage over a shorter period of time than low levels. As noise levels increase, the noise exposure level will increase and the allowable exposure time will be reduced.

Permissible Noise Exposures

Duration per day, hours	Sound Level dBA Slow
16	85
8	90
6	92
4	95
3	97
1	100
1 1/2	102
1	105
1/2	110
1/4 or less	115

Exposure to impulsive or impact noises should not exceed 140 dB peak sound pressure level.

4. DEFINITIONS

Action Level - Action Level is the point where the Hearing Conservation Act (HCA) requires implementation of a hearing conservation program. The action level is defined as an 8 hour time weighted average (TWA) noise exposure of 85 dBA {See 29 CFR 1910.95 (c)}.

Audiometric Testing - Annual audiograms taken after the baseline audiogram to identify changes in hearing acuity.

Baseline Audiogram - Within 6 months of an employee's first exposure at or above the action level.

Exposure Monitoring - Area survey technique in which sound level meter readings are combined with length of time of exposure to individuals in order to calculate the TWA. Employees may observe the monitoring. OHM must notify each employee exposed at or above an 8-hour TWA of 85 dBA of the results of the monitoring.

HCA - Hearing Conservation Act, 1983, mandated OSHA to revise 29 CFR 1910.95 to define an effective hearing conservation program.

Hearing Attenuation - The ability to reduce the severity of the noise exposure.

NR - Noise Reduction Rating is the method of measuring the reduction of employee noise exposures.

PEL - Permissible exposure limit: Noise dose that would result from a continuous 8-hour exposure to a sound level of 90 dBA. This is also described as a 100% dose.

STS - Standard Threshold Shift are changes in hearing acuity that exceed an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear, relative to the baseline audiogram.

5. AUDIOMETRIC TESTING PROGRAM

5.1 OHM will establish an employee audiometric testing program for all employees who may be exposed above the action level.

5.2 The testing program will be provided at no cost to the employees.

5.3 The audiometric testing program will consist of the following:

- Baseline audiogram
- Annual audiogram

6. POSTED AREAS

Areas where sound levels are greater than or equal to 85 dBA must be posted with appropriate signs to caution that hearing damage may result from working in these areas. The site safety officer (SSO) shall monitor all high noise level areas annually or when any change occurs which is suspected of increasing exposure and document these readings on the Noise Survey Form at the end of this procedure.

7. HEARING PROTECTION

Hearing protection should be used by anyone who suspects that a noise source to which they are exposed may exceed allowable limits. OHM provides a variety of suitable hearing protectors from which employees can choose and provides training in the use and of care of these devices along with ensuring proper initial fitting.

7.1 Work Areas - Specific work areas may be identified as noise sensitive areas and signs have been posted to notify personnel that hearing protection is required. Employees should consult their supervisor for hearing protection requirements; and for appropriate devices.

7.2 Tool Noise - Hearing protectors are required for persons performing certain tasks or operating certain tools as listed below. Persons within 15 feet of such operations should also wear hearing protectors. Ear muffs are recommended for persons working in areas where noise levels (equipment and tools) are in excess of 105 dBA. Such work tasks include use of the following:

jack hammer	cup wheel air grinder
pile driver	skid units
impact gun	table saw
impact wrench	radial saw
disc grinder	sandblasting
skill saw	welding
	high volume vacuums (guzzlers)

8. RESPONSIBILITIES

8.1 Each OHM supervisor is responsible for administering the Hearing Conservation Program in his area to include:

- Ensuring that hearing protectors are worn when necessary by OHM personnel, contractor employees, and visitors.
- Posting high noise level area signs where required.

The employee is responsible for the following:

- Utilizing the provided hearing protectors in accordance with instructions and training.
- Participating in monitoring surveys, audiometric testing programs, and hearing conservation training sessions.
- Notifying supervision of any potential high noise level area not previously identified.

8.3 The SSO is responsible for the following:

- Scheduling and conducting area and representative noise level monitoring surveys using the attached forms.
- Selection of hearing protection devices to be used/worn.
- Calibration of noise level monitoring equipment on a per usage basis.
- Communicating monitoring results to OHM supervision and ensuring the recording of monitoring data in employees' medical files using the attached forms.

8.4 Corporate Occupational Health Supervisor responsibilities:

- Ensuring that audiometric testing is performed in compliance with 29 CFR 1910.95 (m)(2)
- Prepare employee notification letter.

9. TRAINING PROGRAM

9.1 The corporate health and safety training coordinator will ensure that the annual training of all OHM employees includes the following:

- The effects that noise has on hearing.
- The purpose of hearing protectors.
- The advantages and disadvantages of various types of hearing protectors
- The attenuation of various types of hearing protection

- The selection, fitting, and use and care of hearing protectors.
- The purpose of audiometric testing
- An explanation of the audiometric testing procedures.

10. RECORDKEEPING

The OHM occupational health supervisor will maintain an accurate record of employee exposure measurements which includes the following information:

10.1 Audiometric Tests

- Job classification
- Date of audiogram
- Examiner's name
- Date of last acoustic calibration of audiometer.
- Employees' most recent noise exposure assessment.
- Record of the measurements of the background sound pressure levels in the test room.

10.2 Record Retention

- Noise exposure records must be kept for two years.
- Audiometric testing records must be kept for the length of the employees employment plus 30 years.

10.3 Access to Records

Records must be provided on request to employees, former employees, representative designated by individual employees, and the Assistant Secretary of the Department of Labor.

**OHM
NOISE SURVEY FORM**

DIAGRAM: (Locations Indicated by Observation Number)

Date: _____

Location: _____

No. of People Exposed: _____

Meter: _____

Operator: _____

Signed: _____

Time: _____

Humidity: _____

Wind: _____

Temp: _____

Observation

Number _____

Scale

(A) dB

Scale

(B) dB

Scale

(C) dB

APPENDIX J

HEAT STRESS PROGRAM



OHM Corporation

HEALTH & SAFETY PROCEDURES

HEAT STRESS

PROCEDURE NUMBER 22

Page 1 of 3

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

In work situations where heat stress may be a factor, OHM Remediation Services Corp. (OHM) will attempt to prevent heat related illness by use of work-rest schedules, physiological monitoring and/or personal cooling devices.

2. PURPOSE

This procedure describes the causes, symptoms, treatment, and prevention of heat-related illness.

3. GENERAL INFORMATION

3.1 Heat-related illnesses are caused by the body's inability to dissipate metabolic heat in conjunction with excessive environmental heat and wearing PPE.

3.2 A period of adjustment or acclimatization is necessary before maximum tolerance to heat is acquired. Most workers require 7 to 10 working days of gradually increasing workload to become fully acclimatized.

4. HEAT-RELATED ILLNESSES

4.1 Heat rash can be caused by continuous exposure to hot and humid air and skin abrasion from sweat soaked clothing.

Signs and Symptoms: The condition is characterized by a localized red skin rash and reduced sweating. Aside from being a nuisance, the ability to tolerate heat is reduced.

Treatment: Keep skin hygienically clean and allow it to dry thoroughly after using chemical protective clothing.

4.2 Heat cramps are caused by profuse perspiration with inadequate fluid intake and salt replacement. This often robs the larger muscle groups (stomach and quadriceps) of blood which can make them cramp.

Signs and Symptoms: Muscle spasm and pain in the extremities and abdomen.

Treatment: Remove affected person to a cool place and give sips of clear water or an electrolytic drink (Gatorade). It should be recommended to the person experiencing heat cramps to lightly salt their food to make up for the sodium lost when sweating. Manual pressure may also be applied to the cramped muscles.

- 4.3 Heat exhaustion is a mild form of shock caused by sustained physical activity in heat and profuse perspiration without adequate fluid and salt replacement.

Signs and Symptoms: Weak pulse; shallow breathing; pale, cool, moist (clammy) skin; profuse sweating; dizziness; fatigue

Treatment: Remove affected person to a cool place and remove as much clothing as possible. Give sips of water or electrolytic solution and fan the person continually to remove heat by convection. **CAUTION:** Do not allow the affected person to become chilled – treat for shock if necessary.

- 4.4 Heat stroke is the most severe form of heat stress; the body must be cooled immediately to prevent severe injury and/or death. **THIS IS A MEDICAL EMERGENCY!!**

Signs and Symptoms: Red, hot, dry skin; body temperature of 105 degrees Fahrenheit or higher; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma

Treatment: Heat stroke is a true medical emergency. Transportation of the victim to a medical facility must not be delayed. Prior to transport, remove as much clothing as possible and wrap the victim in a sheet soaked with water. Fan vigorously while transporting to help reduce body temperature. Apply cold packs, if available; place under the arms, around the neck, or any other place where they can cool large surface blood vessels. If transportation to a medical facility is delayed, reduce body temperature by immersing victim in an ice/water bath (however, be careful not to over chill the victim once body temperature is reduced below 102 degrees Fahrenheit). If this is not possible, keep victim wrapped in a sheet and continuously douse with water and fan.

5. SPECIFIC REQUIREMENTS

- 5.1 The environmental hazards section of site health and safety plans will address heat stress if the ambient temperature is expected to exceed 65 degrees Fahrenheit.
- 5.2 The site health and safety plan will discuss work-rest cycles and provisions for monitoring the level of heat stress (i.e., pulse rate).

- 5.3** Workers are to be advised not to drink caffeinated or alcoholic beverages because they increase the rate of body water loss.
- 5.4** Increased dietary salt or lightly salted (0.2 percent) water is adequate to replace lost salt. Salt tablets are not to be used.
- 5.5** If juice or electrolyte drinks are used, they should be diluted prior to drinking.
- 5.6** Thirst is not an adequate indicator of body water loss. Workers are to drink at least small amounts of water on each break.
- 5.7** Workers are to rest when any of the symptoms described above are present. The buddy system is mandatory, as most often the potential victim will not be aware of any symptoms. Watch out for each other.

APPENDIX K

SITE MAPS

PLOT SCALE: 1" = 1"

OHM CORPORATION
FINDLAY, OHIO

DRAWN BY

CHECKED BY

APPROVED BY

DRAWING
NUMBER

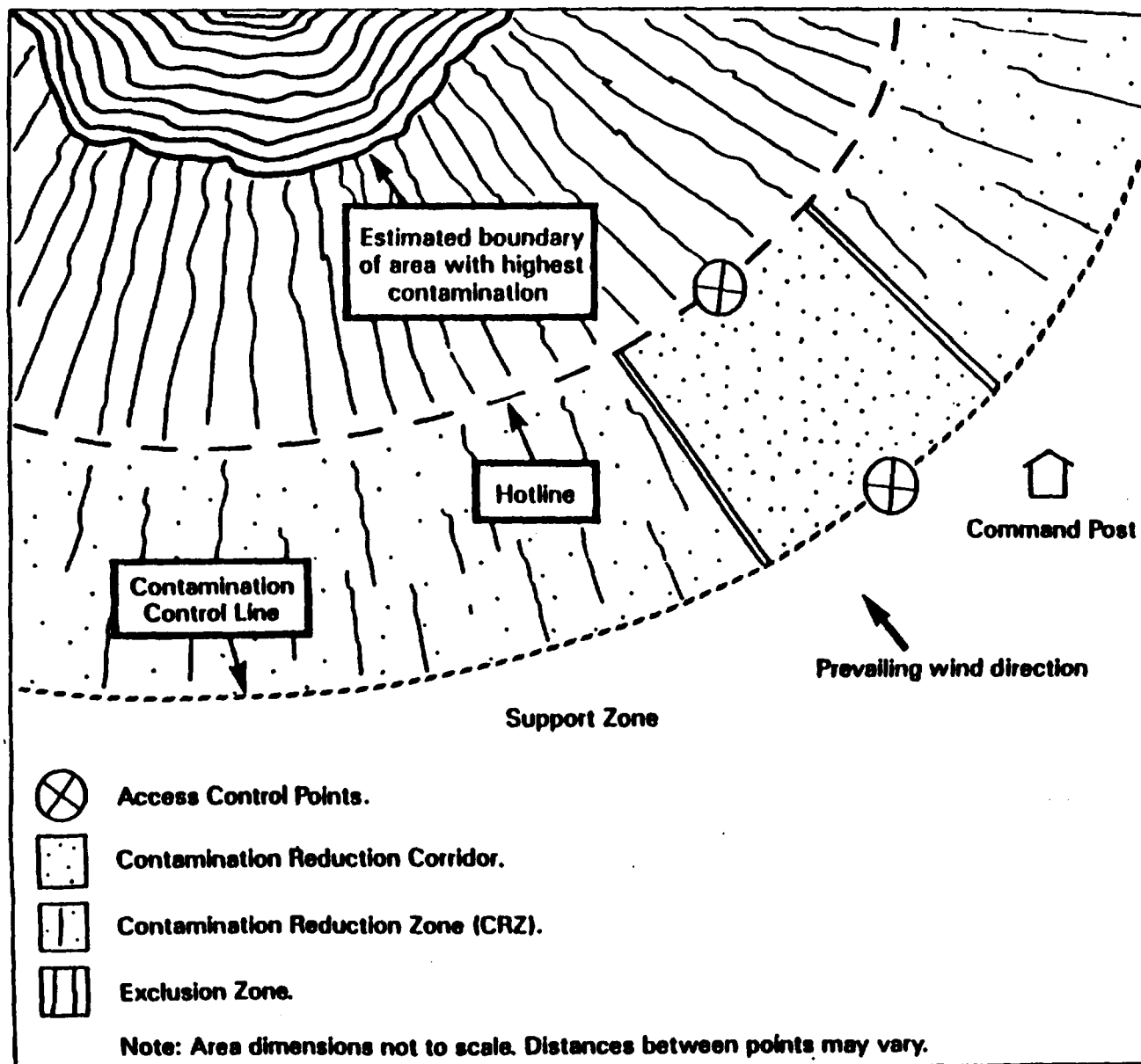


FIGURE 1
WORK ZONES



OHM Corporation

PLOT SCALE: 1" = 1"

OHM CORPORATION
FINDLAY, OHIO

DRAWN BY

CHECKED BY

APPROVED BY

DRAWING
NUMBER



FIGURE 2
SITE MAP



OHM Corporation

PLOT NO.	1" = 1"	OHM CORPORATION FINDLAY, OHIO	DR/	BY	CHECKED BY	APPROVED BY	DRAWING NUMBER	1123--A3

FIGURE 3
HOSPITAL MAP



OHM Corporation

DRAWING NUMBER 10123-A4

APPROVED BY

CHECKED BY

DRAWN BY

OHM CORPORATION
FINDLAY, OHIO

PLOT SCALE: 1" = 1'



FIGURE 4
MAP TO SITE



OHM Corporation

APPENDIX L

RESPIRATORY PROTECTION PROGRAM



OHM Corporation

HEALTH & SAFETY PROCEDURES

RESPIRATORY PROTECTION

PROCEDURE NUMBER 18

Page 1 of 8

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

No individual will enter an area where the use of respiratory protective equipment is required unless the person has been trained in the selection, use, care and limitations of the respirators, and the proper respirator has been selected for the task and fit tested.

2. PURPOSE

The purpose of this procedure is to provide information and guidelines for the selection, use, and care of respiratory protective equipment for all OHM Remediation Services Corp. (OHM) and contractor personnel. This procedure complies with the requirements of 29 CFR 1910.134.

3. GENERAL

- 3.1 The use of engineering controls should be the primary respiratory hazards method to limit employee exposure to respiratory hazards.
- 3.2 Respirators shall be worn when engineering controls are unsuccessful and:
 - When the PEL (Permissible Exposure Limit), TLV (threshold limit value), or ceiling limit for the material exposure is approached or exceeded, as measured by sampling.
 - As deemed appropriate by the regional health and safety manager.
- 3.3 Respirators can only be worn by individuals who have been properly trained and fit tested.
- 3.4 The regional health and safety manager will evaluate annually the effectiveness of the respirator program and report his findings to the vice president of health and safety.
- 3.5 The respirator program coordinator for each region will be the regional health and safety manager.

- 3.6 Only respirators approved by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA) which are appropriate for the potential hazard shall be worn.

4. SELECTION OF RESPIRATORS

- 4.1 Engineering controls should always be the primary control of contaminated air (i.e. elimination of source of contamination, ventilation equipment, barriers, etc).
- 4.2 Once the need for respirators has been established, the respirators shall be selected on the basis of the hazards to which the worker is exposed.

4.1.1 Selection criteria should include:

- The concentration of the contaminant.
- Whether the contaminant may be sufficiently toxic to be immediately dangerous to life or health (IDLH).
- The possibility of oxygen deficiency.
- The useful life of the respirator or cartridge.
- The escape routes available.
- Whether the equipment is intended for emergency use, for periodic use, or for stand-by purposes.

- 4.3 Characterization of the hazard and proper respirator data will be performed to determine what type respirator will be used.

5. MEDICAL SCREENING

- 5.1 Prior to assigning personnel tasks requiring the use of respirators, the employee shall be medically evaluated in compliance of requirements of 29 CFR 1910.134(a)(10).
- 5.2 Employees not physically and psychologically capable of wearing respirators shall not be assigned to such work.
- 5.3 The medical status of each employee is to be reviewed as outlined in Procedure 10 and as may be deemed necessary if the physical status of the employee changes.

6. FIT TESTING

- 6.1 Fit testing will be performed in accordance with accepted fit test procedures by the regional health and safety manager or their designated employee who has been trained and qualified to do so.
- 6.2 Records of fit testing shall be maintained by the employee's division office and/or corporate human resources.

7. RESPIRATOR USE INSTRUCTIONS

- 7.1 Respirators must be used only by those employees who have been properly trained and qualified on the specific type of respirator to be worn.
- 7.2 All employees whose job assignment requires the use of respirators shall be given respirator training at the time of fit testing before being assigned to the job. Retraining must be performed annually on each type of respirator worn by the individual. Training records must be kept.
- 7.3 Only respirators and cartridges approved for the hazardous atmosphere to be encountered will be used.
- 7.4 Only NIOSH/MSHA approved, respirators will be worn by an individual.
- 7.5 CAUTION: Full face piece or one-half face piece air-purifying respirators are not to be used where there is an oxygen deficiency. Only air-supplied full-face respirators with an emergency escape cylinder or self-contained breathing apparatus will be worn when an oxygen deficiency exists.
- 7.6 CAUTION: A respirator does not protect against excessive heat or against hazardous substance that can attack the body through the skin.
- 7.7 Contact lenses shall not be worn with full-face respirators.
- 7.8 A person wearing a respirator must be clean-shaven in the area of the face piece seal. Long hair, sideburns, and skull caps that extend under the seal are not allowed. Glasses with temple pieces extending under the seal are not allowed. Persons with facial conditions that prevent a proper seal are not allowed to wear a full-face piece respirator until the condition is corrected. Facial conditions which may cause a seal problem include missing dentures, scars, severe acne, etc.

8. RESPIRATOR INSPECTION

8.1 Respirators shall be inspected by the user before and after each day's use and those not used routinely shall be inspected once a month.

8.2 Inspection procedure air purifying respirators (full-face piece and one half-face piece cartridge/canister respirators)

8.2.1 Examine the face piece for:

- Excessive dirt
- Cracks, tears, holes, or distortion from improper storage.
- Inflexibility
- Cracked or badly scratched lenses.
- Incorrectly mounted lens or broken or missing mounting clips.
- Cracked or broken air purifying element holder, badly worn threads, or missing gaskets.

8.2.2 Examine the head straps or head harness for:

- Breaks or cracks
- Broken or malfunctioning buckles. Excessively worn serrations on the head harness which may permit slippage.

8.2.3 Examine exhalation valve for the following after removing cover:

- Foreign material
- Cracks, tears, or distortion in the valve material.
- Improper insertion of the valve body in the face piece.
- Cracks, breaks, or chips in the valve body, particularly in the sealing surface.
- Missing or defective valve cover.
- Improper installation of the valve in the valve body.

8.2.4 Examine the air purifying elements for:

- Missing cartridge adapter gasket
- Incorrect cartridge/canister, or filter for the hazard.
- Incorrect installation, loose connections, missing or worn gaskets, or cross threading in the holder.
- Cracks or dents in outside case or threads of filter or cartridge/canister.

8.2.5 If the device has a corrugated breathing tube, examine it for:

- Broken or missing end connections.
- Missing or loose hose clamps.
- Deterioration, determined by stretching the tube and looking for cracks.

8.3 Inspection procedure air-supplied respirators (full-face piece air line respirators and self contained breathing apparatus (SCBA)) should be inspected as follows:

8.3.1 If the device has a tight-fitting face piece, use the procedures outlined for air purifying respirators will be followed, except those pertaining to the air purifying elements.

8.3.2 The inspection of air-supplied respirators should include checks on the following items:

- Tightness of connections
- Condition of all rubber parts
- Air cylinder (SCBA & egress) must be fully charged and the hydrotest certification must be current (SCBA cylinders-3 years/egress cylinders 5 years).
- Regulators and warning devices function properly.
- Does each unit (SCBA & egress) have a distinct identification number permanently affixed or engraved on the regulator?

- 8.4 A record of respirator inspections including date and inspectors initials and maintenance will be maintained for all pieces of respiratory protective equipment designated for emergency response. The SCBA inspection form follows this procedure.

9. CLEANING OF RESPIRATORS

- 9.1 Respirators assigned and worn by one individual must be cleaned after each day's use. Visitors's or multi-assigned respirators must be cleaned and disinfected after each use.
- 9.2 Extreme caution must be exercised to prevent damage from rough handling during the cleaning procedure.
- 9.3 After cleaning, respirators must be reassembled.
- 9.4 A respirator spray disinfectant is approved as disinfectant between continuous use but not for cleaning and sanitizing after each day's use.
- 9.5 Cleaning Procedure for Individually assigned Respirators
- 9.5.1 Washing: The respirator must be disassembled and washed with a mild liquid detergent in warm water. A brush should be used. To avoid damaging the rubber and plastic in respirator face pieces, use a soft bristle brush and a cleaner/water solution between 90 and 100°F.
- 9.5.2 Rinsing: The respirator should be rinsed thoroughly in clean water (140°F maximum) to remove all traces of detergent. This is very important to prevent dermatitis.
- 9.5.3 Drying: The following drying methods may be used: draining and drying on a clean surface; draining and drying when hung from racks (take care to prevent damage); towel drying with soft clothes or paper towels.
- 9.6 Cleaning Procedure for Visitor or Multi-Assigned Respirators
- 9.6.1 Washing: The respirator must be disassembled and washed with a brush in a cleaning solution in warm water. To avoid damaging the rubber and plastic in respirator face pieces, use a soft bristle brush and a cleaner/water solution between 90 and 100°F.

- 9.6.2 Rinsing: The respirator must be immersed in a disinfectant solutions noted below for at least 2 minutes and then rinsed in clean water at 140°F maximum.
- 9.6.3 Disinfection: 50 ppm of chlorine in a hypochloride solution made from household bleach (2 ml. to one liter of water).
- 9.6.4 Drying: The following drying methods may be used: draining and drying on a clean surface; draining and drying when hung from racks (take care to prevent damage); and drying in steel storage cabinets with built-in circulation fans. (Solid shelves should be replaced with steel mesh).

10. MAINTENANCE OF RESPIRATORS

- 10.1 Respirator maintenance shall only be performed by qualified personnel, for example site supervisors and site safety officers.
- 10.2 Approved replacement parts must be used. Substitution of parts from a different brand or type of respirator invalidates the technical approval of the respirator.
- 10.3 Maintenance performed on a self-contained breathing apparatus shall be done only by an individual who has been certified by the manufacturer.

11. STORAGE OF RESPIRATORS

- 11.1 When not in use, respirators must be stored to protect them from dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and physical damage.
- 11.2 Respirators must be stored in reusable plastic bags between shifts.
- 11.3 The respirator storage environment must be clean, dry and away from direct sunlight. Upright cabinets and wall-mounted cases are suggested.

12. BREATHING AIR

Breathing air shall meet at least the requirements of the specification for Grade D breathing air or better (D, E, or G not A, K, or L) as described in the American National Standard Commodity Specification for Air ANSI/CGA G-71-1989.

13. COLOR CODE

NIOSH recognizes the following standard color codes for respirator cartridges. The color codes can be used as a general guideline, however, personnel should refer to the NIOSH technical certification (TC) to verify adequate protection.

Acid gases	White
Organic vapors	Black
Ammonia gas	Green
Acid gases and organic vapors	Yellow
High Efficiency Particulate Air (HEPA)	
Dust, fumes, and mists (including asbestos and radioactive materials)	Magenta (Purple)
Dusts, fumes, and mists (other than asbestos and radioactive materials)	Orange



OHM Corporation

RESPIRATOR FIT TEST RECORD

Name: _____

Employee Number: _____

Date of Test: _____

Expiration Date: _____

Type of Fit Test:

☐ Quantitative
Protective Factor _____

☐ Qualitative

TESTING AGENT:

Isoamyl Acetate ☐
(Banana Oil)

Irritant Smoke ☐

Saccharin ☐

RESPIRATOR DESCRIPTION

Manufacturer: _____

Model: _____

Size: _____

Test Conducted by: _____
(Please print)

Signature of Conductor: _____

I certify that I have been trained on the proper use, instructed on maintenance procedures, and have passed a respirator fit test as described above.

SIGNATURE OF EMPLOYEE: _____

OPY TO: Employee Home Division
Corporate Personnel Office (FAX Number: 419-425-6069)

APPENDIX M

PROJECT SITE INSPECTION FORM



OHM Corporation

OHM Corporation
Project Site Safety Inspection Checklist

Project Name: _____
Project Number: _____
Project Location: _____
Site Supervisor: _____
Inspector's Name: _____

MEDICAL AND FIRST AID

YES NO

1. Are First Aid Kits accessible and identified? _____
2. Are emergency eye wash and safety showers available? _____
3. Are daily logs for first aid present and up to date? _____
4. Are First Aid Kits inspected weekly? _____

PERSONAL PROTECTIVE EQUIPMENT

1. Have levels of personnel protection been established? _____
2. Do all employees know their level of protection? _____
3. Are respirators used decontaminated, inspected, and stored according to standard procedures? _____
4. Have employees been fit-tested? _____
5. Is defective personal protective equipment tagged? _____
6. Does compressed breathing air meet CGA Grade "D" minimum? _____
7. Are there sufficient quantities of safety equipment and repair parts? _____
8. Does Level D protection consist of safety glasses, hard hats, and steel toe boots? _____

FIRE PREVENTION

1. Is smoking prohibited in flammable storage areas? _____
2. Are fire lanes established and maintained? _____
3. Are flammable dispensing systems grounded and bonded? _____
4. Are approved safety cans available for storage of flammable liquids? _____
5. Has the local fire department been contacted? _____
6. Are fire extinguishers available near refueling areas? _____

AIR MONITORING

1. Is air monitoring being conducted as required by the site safety plan? _____
2. Are air monitoring instruments calibrated daily? _____
3. Is the air monitoring logbooks up to date? _____
4. Are user manuals available? _____
5. Are instruments clean and charged? _____

WELDING AND CUTTING (29 CFR 1926 Subpart J)

1. Are fire extinguishers present at welding and cutting operations? _____
2. Are confined spaces; such as, tanks, pipelines, and trenches; tested prior to cutting and welding operations? _____
3. Are Hot Work Permits available? _____
4. Are proper helmets, goggles, aprons, and gloves available for welding and cutting operations? _____
5. Are welding machines properly grounded? _____
6. Are oxygen and fuel gas cylinders stored a minimum of 20 feet apart? _____
7. Are only trained personnel permitted to operate welding and cutting equipment? _____

HAND AND POWER TOOLS (29 CFR 1926 Subpart I)

1. Are defective hand and power tools tagged and taken out of service? _____
2. Is eye protection available and used when operating power tools? _____
3. Are guards and safety devices in place on power tools? _____
4. Are power tools inspected before each use? _____
5. Are non-sparking tools available? _____

MOTOR VEHICLES

1. Are vehicles inspected daily? _____
2. Are personnel licensed for the equipment they operate? _____
3. Are unsafe vehicles tagged and reported to supervision? _____
4. Are vehicles shut down before fueling? _____
5. When backing vehicles, are spotters provided? _____
6. Is safety equipment on vehicles? _____
7. Are loads secure on vehicles? _____
8. Are vehicle occupants using safety belts if provided? _____

EMERGENCY PLANS

1. Are emergency telephone numbers posted? _____
2. Have emergency escape routes been designated? _____
3. Are employees familiar with the emergency signal? _____
4. Has the emergency route to the hospital been established and posted? _____

MATERIALS HANDLING

1. Are materials stacked and stored as to prevent sliding or collapsing? _____
2. Are flammables and combustibles stored in non-smoking areas? _____
3. Is machinery braced when personnel are performing maintenance? _____
4. Are tripping hazards labeled? _____
5. Are semi-trailers chocked? _____
6. Are fixed jacks used under semi-trailers? _____
7. Are riders prohibited on materials handling equipment? _____
8. Are cranes inspected as prescribed and logged? _____
9. Are OSHA approved manlifts provided for the lifting of personnel? _____
10. Are personnel in manlifts wearing approved fall protection devices? _____

FIRE PROTECTION

1. Has a fire alarm been established? _____
2. Do employees know the location and use of all fire extinguishers? _____
3. Are fire extinguisher locations marked? _____

FIRE PROTECTION (Continued)

4. Are combustible materials segregated from open flames? _____
5. Have fire extinguishers been professionally inspected during the last year? _____
6. Are fire extinguishers visually inspected monthly? _____

ELECTRICAL (29 CFR 1926 Subpart K)

1. Is electrical equipment and wiring properly guarded? _____
2. Are electrical lines, extension cords, and cables guarded and maintained in good conditions? _____
3. Are extension cords kept out of wet areas? _____
4. Is damaged electrical equipment tagged and taken out of service? _____
5. Have underground electrical lines been identified by proper authorities? _____
6. Has positive lock-out system been established by a certified project electrician? _____
7. Are GFCTs being used as needed? _____
8. Are extension cords being inspected daily for ground continuity and structural integrity? (i.e., ground pin in place, no unapproved splices) _____
9. Are warning signs exhibited on high voltage equipment (250V or greater)? _____
10. Is extension cord inspection documented? _____

CRANES AND RIGGING (29 CFR 1926.550)

1. Are cranes inspected daily? _____
2. Are crane swing areas barricaded or demarked? _____
3. Is all rigging equipment tagged with an identification number and rated capacity? _____
4. Is rigging equipment inspection documented? _____
5. Are slings, chains, and rigging inspected before each use? _____
6. Are damaged slings, chains, and rigging tagged and taken out of service? _____
7. Are slings padded or protected from sharp corners? _____
8. Do employees keep clear of suspended loads? _____
9. Are employees in the lift area wearing hard hats? _____

COMPRESSED GAS CYLINDERS

1. Are breathing air cylinders charged only to prescribed pressures? _____
2. Are like cylinders segregated in well ventilated areas? _____
3. Is smoking prohibited in cylinder storage areas? _____
4. Are cylinders stored secure and upright? _____
5. Are cylinders protected from snow, rain, etc.? _____
6. Are cylinder caps in place before cylinders are moved? _____
7. Are fuel gas and O2 cylinders stored a minimum of 20 feet apart? _____
8. Are propane cylinders stored and used outside the structure? _____

SCAFFOLDING (29 CFR 1926.451)

1. Is scaffolding placed on a flat, firm surface? _____
2. Are scaffold planks free of mud, ice, grease, etc.? _____
3. Is scaffolding inspected before each use? _____
4. Are defective scaffold parts taken out of service? _____
5. Does mobile scaffold height exceed 4 times the width or base dimension? _____
6. Does scaffold planking overlap a minimum of 12 inches? _____
7. Does scaffold planking extend over end supports between 6 to 18 inches? _____
8. Are employees restricted from working on scaffolds during storms and high winds? _____
9. Are all pins in place and wheels locked? _____
10. Is perimeter guarding (top rail, mid rail, and toe board) present? _____

WALKING AND WORKING SURFACES

- | | | |
|--|-------|-------|
| 1. Are ladders a Type I or Type II? | _____ | _____ |
| 2. Are accessways, stairways, ramps, and ladders clean of ice, mud, snow, or debris? | _____ | _____ |
| 3. Are ladders being used in a safe manner? | _____ | _____ |
| 4. Are ladders kept out of passageways, doors, or driveways? | _____ | _____ |
| 5. Are broken or damaged ladders tagged and taken out of service? | _____ | _____ |
| 6. Are metal ladders prohibited in electrical service? | _____ | _____ |
| 7. Are stairways and floor openings guarded? | _____ | _____ |
| 8. Are safety feet installed on straight and extension ladders? | _____ | _____ |
| 9. Is general housekeeping up to OHM standards? | _____ | _____ |
| 10. Are ladders tied off? | _____ | _____ |

SITE SAFETY PLAN

- | | | |
|--|-------|-------|
| 1. Is a site safety plan available on site or accessible to all employees? | _____ | _____ |
| 2. Does the safety plan accurately reflect site conditions and tasks? | _____ | _____ |
| 3. Have potential hazards been described to employees on site? | _____ | _____ |
| 4. Is there a designated safety official on site? | _____ | _____ |
| 5. Have all employees signed the acknowledgement form? | _____ | _____ |

SITE POSTERS

- | | | |
|---|-------|-------|
| 1. Are the following documents posted in a prominent and accessible area? | | |
| A. Minimum Wage | _____ | _____ |
| B. OSHA Health and Safety | _____ | _____ |
| C. Equal Employment Opportunity | _____ | _____ |

SITE CONTROL

- | | | |
|--|-------|-------|
| 1. Are work zones clearly defined? | _____ | _____ |
| 2. Are support trailers located to minimize exposure from a potential release? | _____ | _____ |
| 3. Are support trailers accessible for approach by emergency vehicles? | _____ | _____ |
| 4. Is the site properly secured during and after work hours? | _____ | _____ |

HEAVY EQUIPMENT (29 CFR 1926 Subpart O)

- | | | |
|--|-------|-------|
| 1. Is heavy equipment inspected as prescribed by the manufacturer? | _____ | _____ |
| 2. Is defective heavy equipment tagged and taken out of service? | _____ | _____ |
| 3. Are project roads and structures inspected for load capacities and proper clearances? | _____ | _____ |
| 4. Is heavy equipment shut down for fueling and maintenance? | _____ | _____ |
| 5. Are back-up alarms installed and working on equipment? | _____ | _____ |
| 6. Are designated operators only operating equipment? | _____ | _____ |
| 7. Are riders prohibited on heavy equipment? | _____ | _____ |
| 8. Are guards and safety appliances in place and used? | _____ | _____ |

EXCAVATION (29 CFR 1926 Subpart F)

- | | | |
|---|-------|-------|
| 1. Has a "competent person" been designated to supervise this excavation activity? | _____ | _____ |
| 2. Have utility companies been advised of excavation activities? | _____ | _____ |
| 3. Prior to opening excavations, are utilities located and marked? | _____ | _____ |
| 4. Has a professional engineer evaluated all excavations greater than 20 feet deep? | _____ | _____ |
| 5. Is there rescue equipment on-site and accessible to excavation? | _____ | _____ |
| 6. Is excavated material placed a minimum of 24 inches from the excavations? | _____ | _____ |
| 7. Are the sides of excavations sloped or shored to prevent caving in on employees? | _____ | _____ |

EXCAVATION (29 CFR 1926 Subpart P - Continued)

8. Has excavation greater than 4-feet deep been monitored for hazardous atmospheres (i.e. LEL/O2 deficiency)?
9. Are ladders used in excavations over 4-feet deep?
10. Are ladders present every 25 feet?
11. Are barriers, i.e. guardrails or fences placed around excavations near pedestrian or vehicle thoroughfares?
12. Is excavation inspected daily by competent persons and documented?

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

CONFINED SPACES (Proposed Regulation 29 CFR 1910.146)

1. Have employees been trained in the hazards of confined spaces?
2. Are confined space permits available on project site?
3. Is the contractors confined space safety procedure on the project?
4. Has a rescue plan been established?

_____	_____
_____	_____
_____	_____
_____	_____

PERSONNEL DECONTAMINATION

1. Are decontamination stations set up on site?
2. Are waste receptacles available for contaminated clothing?
3. Are steps taken to contain liquids used for decontamination?
4. Have decontamination steps and procedures been covered by the site supervisor or safety official?
5. Is all personal protective equipment and respiratory equipment being cleaned on a daily basis?

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

EQUIPMENT DECONTAMINATION

1. Has equipment decontamination been established?
2. Is contamination wash water properly contained and disposed of?
3. Are all pieces of equipment inspected for proper decontamination before leaving the site?
4. Is all equipment being cleaned on a daily basis?

_____	_____
_____	_____
_____	_____
_____	_____

HAZARD COMMUNICATION (29 CFR 1926.59)

1. Is there a written program on-site?
2. Is there a MSDS FOR EACH CHEMICAL present on-site?
3. Are all containers properly labeled, as to content, hazard?
4. Have employees been trained on chemical hazards?
5. Are employee's trained on chemical hazards while doing non-routine tasks?
6. Do employees (including subcontractors) know and understand the acute and chemical effects of exposure from the chemicals on-site?
7. Have all subcontractors signed the Haz-Comm acknowledgement form?

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

I have reviewed this inspection checklist with the safety inspector and fully understand the recommendation and will make every attempt to correct them immediately.

Signature

Date

Site Supervisor: _____

Project Manager: _____

OHM Compliance
Inspector: _____



OHM Corporation

SCBA MONTHLY INSPECTION CHECKLIST

SCBA ID NO. _____

YEAR _____

ITEM INSPECTED	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Connections are tight												
Face-piece in good condition												
Rubber parts pliable												
Regulator functions properly												
Alarm bell functions properly												
Cylinder fully charged												
Cylinder hydrotest current (within 3 years)												
Unit is clean												
Emergency bypass functions properly												
Inspectors initials and employee number												

DEFICIENCIES IN ABOVE ITEMS REQUIRE UNIT TO BE TAGGED AND REMOVED FROM SERVICE.

APPENDIX N

ACCIDENT INVESTIGATION AND REPORTING PROCEDURE



OHM Corporation

HEALTH & SAFETY PROCEDURES

ACCIDENT/INJURY/ILLNESS INVESTIGATION & REPORTING

PROCEDURE NUMBER 9

Page 1 of 8

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) will work to eliminate accidents, through compliance with Occupational Safety and Health Administration (OSHA) regulations and OHM Standard Operating Procedures (SOPs), as well as supervisor and employee safety training, site safety audits, and constant attention to safety. In the event of an accident involving injury, OHM will perform a thorough accident/incident, investigation in an effort to determine and correct or eliminate the causative agent(s).

2. PURPOSE

This procedure provides for reporting and documenting accidents, injuries, and work related accidents for all employees of OHM.

3. PROCEDURE

The following procedures are minimum requirements for reporting all accidents/incidents. These procedures may be expanded upon, by the regional health and safety manager, to meet the specific needs in each region.

4. REPORTING OF INCIDENT

All accidents/injuries/illnesses, no matter how minor, are to be reported immediately by the employee to the employee's immediate supervisor/manager. Failure to report an injury/illness incident (within 24 hours of occurrence) may result in the company disputing the injury/illness claim.

4.1 Employee Responsibility

The employee is responsible to report any accident, injury or illness, in which the employee is involved, to his/her immediate supervisor/manager. If the employee's immediate supervisor/manager is not available, the incident must be reported to the division manager or worker's compensation handler at the employee's home division.

4.2 Supervisor Responsibility

The supervisor/manager is responsible to see that the employee receives immediate first aid and/or prompt medical treatment should an injury/illness occur. It is also the responsibility of the supervisor/manager to

ensure that all accidents and injuries/illnesses are immediately investigated, reported and documented and distributed in a timely manner as outlined in these procedures.

4.3 Regional Health and Safety Manager

The regional health and safety manager is responsible for notifying OSHA of any incidents involving a fatality or hospitalization of 5 or more employees as required by 29 CFR 1904.8.

4.4 Accident/Injury/Illness Report

The Employee Accident/Injury/Illness Report must be completed for all accidents/incidents including but not limited to:

- Any work-related injury involving muscles and joints (strains/sprains)
- All work-related back injuries
- All work-related chemical exposures
- Any work-related injury/illness which involves first aid and/or medical treatment
- Any work-related accident that results in death of an employee
- Any incident that involves property damage but not necessarily employee injury.
- Any work-related incident (near miss) in which an injury could have occurred and that attention is needed to prevent similar incidents from occurring and preventing an injury accident

The site supervisor should stabilize the accident scene and job site. An accident site should not be disturbed until the investigation is completed. In severe cases, (lost time, serious injury), cordon off the area with caution tape. Consult with regional health and safety personnel to determine if the initial accident investigation was sufficient and if photographs should be taken. All employees involved in the incident or response must remain at the job site until investigation interviews are completed.

The supervisor/manager must ensure that employees whose work related injuries required medical treatment (the employee was taken to a doctor, hospital, clinic, etc.) are not permitted to resume work without a written return to work statement from the treating physician. This statement

should give diagnosis, prognosis, date of return to work and any work limitations. Should a statement such as "light duty" be given, call the treating physician to determine the exact restriction that is needed.

5. DESIGNATE A HEALTH CARE PROVIDER

For cost containment reasons, the use of an emergency room facility should be limited to emergency situations whenever possible. Minor injuries and illnesses should be referred to private physicians and/or out-patient clinics. Plans for the treatment of injuries/illnesses should be made well in advance of any incident. Arrangements should be made with a local health care provider to provide medical services to employees for work related injuries/illnesses. The name, address and phone number of this provider should be posted at all project sites and OHM offices.

6. RESTRICTED WORK

Supervisory personnel must assume responsibility that the company's policy on light duty is communicated to physicians and employees. (The restricted work policy statement should be posted at all job sites and OHM offices.)

Restrictions given by the physician are to be followed. The supervisor shall contact the treating physician or the corporate occupational health supervisor at corporate health and safety in Findlay, Ohio, at extension 6064 should there be any question regarding an employee's ability to return to work.

When the job site is unable to accommodate restricted work activity, the site supervisor must coordinate transfer of the injured employee to his/her home division. The injured employee, upon return to his/her home division, must report to work upon arrival for job assignment and/or evaluation by the Company physician. Any deviation from this procedure must receive prior approval from the corporate occupational health supervisor.

7. MEDICAL BILLS/PRESCRIPTIONS

All bills and receipts (including medications) pertaining to work related injuries should be sent to the employee's home division to the attention of the person who handles worker's compensation claims. Do not use a cash advance for payment of any medical treatment or prescriptions unless there is no other alternative. The employee should obtain and submit a receipt when required to pay for injury related expenses.

8. ACCIDENTS WITHOUT INJURY OR ACCIDENTS CAUSING MINOR INJURIES REQUIRING JOB SITE ADMINISTERED FIRST AID ONLY

- 8.1 Injured employee's supervisor/manager must complete an Employee Accident/Injury/Illness Report. The report must be completed, within 24 hours of an incident or knowledge of an incident, using the injured employee's own words to describe events and injury. The injured employee must sign the report. The supervisor/manager must ensure that the report is completely and accurately filled out and sign the report.
- 8.2 Send all original reports, within 5 working days of the incident, to the division secretary handling worker's compensation for the injured employee. For Ohio employees only, send all original reports to corporate health and safety. Original reports are to be retained in the employee's worker's compensation file.
- 8.3 Fax or forward a copy of all reports to the corporate occupational health supervisor at health and safety in Findlay, Ohio, within 24 hours of the incident. (Fax: 419-425-6039)
- 8.4 Retain a copy in job site safety file.

9. ACCIDENTS CAUSING INJURY THAT REQUIRE MEDICAL TREATMENT OR RESULTS IN RESTRICTED WORK ACTIVITIES OR LOST TIME

- 9.1 The Injury/Illness Status Report is to be completed whenever an injured/ill employee is evaluated or given treatment at a hospital, clinic, doctor's office, etc. The upper portion of this form is to be completed by the supervisor/manager or person sending the employee for treatment and the lower portion of the form is to be completed by the treating physician. The employee must return the original form to his supervisor/manager prior to returning to work or within 24 hours of a lost time incident.
- 9.2 The injured employee's supervisor/manager must complete an Employee Accident/Injury/Illness Report. The report must be completed, within 24 hours of an incident or knowledge of an incident using the injured employee's own words to describe events and injury. The injured employee must sign the report. Supervisor/manager must ensure report is completely and accurately filled out and sign the report.
- 9.3 The supervisor/manager must immediately investigate the accident and should obtain additional information as needed for complete investigation of the incident (photographs, diagrams, witness statements, doctor slips, etc.).

The supervisor/manager must provide a written report, in memo format, detailing the accident/injury incident.

- 9.4** Send all original reports, within 48 hours of the incident, to the division secretary (employee home division) handling worker's compensation for the injured employee. For Ohio employees only, send all original reports to corporate health and safety. Original reports are to be retained in the employee's worker's compensation file.
- 9.5** Fax or forward a copy of all reports to the corporate occupational health supervisor at health and safety in Findlay, Ohio, within 24 hours of the incident. (Fax: 419-425-6039).
- 9.6** Retain a copy of all reports in job site safety file.
- 9.7** **THE FOLLOWING VERBAL NOTIFICATIONS BY TELEPHONE MUST BE MADE IMMEDIATELY:**
- Corporate occupational health supervisor (800-537-9540)
 - Regional health and safety manager
 - Division manager/Worker's compensation handler (employee home division)
- 9.8** Provide restricted/modified work assignment consistent with company policy.
- 10. ADDITIONAL REQUIREMENTS FOR LOST TIME INJURY ONLY:** (Employee is medically not able to do any work due to an injury/illness.)
- 10.1** The Supervisor/Manager must:
- Complete the Notice of Lost Time Injury/Death and fax or send a copy to the regional manager, regional health and safety manager and the vice president of health and safety within 24 hours of the incident.
- 10.2** The Division Manager and Project Manager must:
- Conduct a joint site inspection and submit a report to the regional manager detailing the causes of the accident within 5 days of the incident. A copy of this report must be sent to the vice president of health and safety in Findlay, Ohio. When necessary, assistance in investigating a lost time injury case may be obtained from the regional health and safety manager or corporate health and safety.

11. ACCIDENT/INJURY/ILLNESS RESULTING IN DEATH OF EMPLOYEE

- 11.1 The employee's supervisor/manager must IMMEDIATELY notify the division manager and the regional health and safety manager and complete the Notice of Lost Time Injury/Death and fax or send a copy to the regional manager, regional health and safety manager, and the vice president of health and safety within 24 hours of the incident.

Fax Numbers

Corporate Health & Safety	419-425-6039
Midwest Region	419-424-4966
Northeast Region	609-987-8860
Southeast Region	404-729-3905
Southwest Region	713-875-2300
Western Region	510-256-6111

- 11.2 The division manager must IMMEDIATELY notify the regional manager.
- 11.3 The regional health and safety manager must IMMEDIATELY notify the vice president of health and safety, consult corporate legal counsel and notify OSHA.
- 11.4 The regional manager must IMMEDIATELY notify the president and chief executive officer of the corporation.
- 11.5 A complete investigation of the incident will be conducted by the vice president of health and safety and/or his appointed designee(s).

12. FORMS**12.1 OHM EMPLOYEE ACCIDENT/INJURY/ILLNESS REPORT
(Form 0084)**

This form must be completed for all accidents and signed by the employee, supervisor/ manager and safety official. The supervisor/manager must complete and sign the report following a complete investigation of the incident. This report should be completed using the employee's "own words" to describe the details of events involved in the incident. The employee must sign the report unless medically unable to do so.

This report meets the requirements of the OSHA Form No. 101 and provides necessary information for completion of a first report of injury for worker's compensation claim. Forms may be obtained through corporate health and safety.

12.2 INJURY/ILLNESS STATUS REPORT (Form 0085)

This report must be completed at the time of each medical evaluation relating to an injury/illness. Information provided on this report is necessary to determine the employee's ability to work, if the incident is OSHA recordable and for the administration of worker's compensation claims.

This report also serves as an authorization to release medical information which is required to obtain doctor's reports, emergency room records, x-ray reports, lab reports, etc., pertaining to the work-related incident. The medical release must be signed by the employee.

The upper portion of this report is to be completed by the supervisor/manager or person sending the employee for treatment and the lower portion of the form is to be completed and signed by the treating physician. The white copy of the report must be given to the employee or the immediate supervisor, the treating physician/agency retains the yellow copy. Forms may be obtained through corporate health and safety.

12.3 NOTICE OF LOST TIME INJURY/DEATH

This report is required to be completed in any accident/injury case in which lost time or death is involved. The notice must be completed by the division manager and forwarded to corporate health and safety within 24 hours of the incident. Forms may be obtained through corporate health and safety.

12.4 WITNESS FORM

This form is to be used to obtain a signed statement from individuals who have witnessed the injury/incident or have pertinent information relating to the incident. Forms may be obtained through corporate health and safety.

13. POSITION STATEMENT ON MODIFIED WORK

It is the objective of OHM to minimize accidents to the fullest extent as practical through strict compliance with OSHA regulations and OHM SOPs, as well as supervisor and employee safety training, site safety audits, and constant attention to safety. Should an employee have the misfortune of being injured or becoming ill in the course of, and arising from his/her employment, OHM will endeavor to provide an injured employee an alternate, temporary assignment when the

employee can return to work with a restriction. Modified (Light Duty) work will be made available in order to bring the injured employee back to the work environment, for the benefit of the employee and the company, whenever medically appropriate.

Employees are expected to return to modified work when medically capable. The work assigned the injured employee will be work that will not aggravate the medical condition and meets the restrictions set forth by the treating and/or company physician. Examples of modified work include, but are not limited to, office work, dispatching, and light shop work.

Employees accepting modified work will be paid the rate of pay they were earning immediately prior to the period of disability and are subject to evaluation by the company physician, at the company's discretion.

NOTICE OF LOST TIME INJURY/DEATH

Please Type or Print

Employee's Name: _____

Employee's No.: _____

Location: _____

Supervisor's Name: _____

Date of Injury/Death: _____ Time: _____

Brief Description of Incident: _____

Immediate Corrective Action: _____

Tentative Follow-up Corrective Action: _____

Signature: _____ Supervisor Manager

Date: _____

Distribution

o Fax to the following:

1) Fred Halvorsen, Vice President, Health and Safety
Fax (419) 425-6039; Phone (419) 424-4910

2) Regional Manager

o Original: Corporate Health and Safety

o Copy: Site Safety File

WITNESS FORM

NAME _____ AGE _____

ADDRESS _____

PHONE _____ MARITAL STATUS _____

OCCUPATION _____

DATE ACCIDENT WITNESSED _____ TIME _____

LOCATION OF ACCIDENT _____

MY POSITION AT TIME OF ACCIDENT _____

MY LOCATION AT TIME OF ACCIDENT _____

NARRATIVE REPORT

Describe in your own words what happened. (What did you see, hear, smell, do, etc.):

I have read the above report and it is true and correct to the best of my knowledge. I do not recall any other facts of this accident.

(Signature of witness)

____/____/____
(date)



OHM Corporation

☐ Accident
Property Damage
Vehicle Involved

☐ Injury
☐ Yes
☐ Yes

☐ Illness
☐ No
☐ No

Health & Safety Use Only

Case # _____
☐ First Aid Only
☐ Medical Treatment
☐ Lost Workdays - Restricted Activity
☐ Lost Workdays - Away from Work
☐ Fatality

Incident Date and Time of Incident _____ a.m. _____ p.m.

Shift ☐ 1st ☐ 2nd ☐ 3rd

OHM CORPORATION _____

(Employee's Home Division/Regional Office/Subsidiary)

Address _____
City _____ State _____

PROJECT IDENTIFICATION (Project Related Incidents Only)

Project No. _____ Project Start Date _____ Completion Date _____

Location (Full Address) _____

Telephone _____ Project Manager _____

EMPLOYEE INFORMATION

Employee's Full Name _____ Employee No. _____

☐ Regular Full Time ☐ Regular Part Time ☐ Temporary ☐ Non-Employee

Home Address _____

Date of Birth _____ Age _____ Social Security No. _____ - _____ - _____ Sex ☐ M ☐ F

Job Title _____ Department _____ Date Hired _____

Length of Employment ☐ In Training, ☐ _____ Mos. ☐ _____ Yrs. Time in Job Class ☐ In Training, ☐ _____ Mos. ☐ _____ Yrs.

Name of Employee's Direct Supervisor _____

Supervision at Time of Accident ☐ Directly Supervised ☐ Indirectly Supervised ☐ Not Supervised

Specific Location Where Incident Occurred _____

☐ OHM Facility ☐ Project Site ☐ Other _____

To Whom Was Incident Reported? _____ When? _____

Witness Name/Address _____

Witness Job Title/Reason in Area _____

Describe Employee's Job Duties Being Performed When Injured _____

Describe Fully the Events Which Resulted in the Accident/Injury/Illness _____

PLEASE CONTINUE ON BACK OF THIS FORM

(Use Extra Page if Needed)

Describe the Injury/Illness in Detail; Indicate Part of Body Affected _____

Name of Object/Substance Which Directly Injured Employee _____

Will Employee Seek Treatment? ☐ Yes ☐ No Did Employee Die? ☐ Yes ☐ No

Name/Address of Hospital/Doctor _____

Describe Treatment Given _____

Is Employee Able To Return To Work? ☐ Yes ☐ No

Work Status: ☐ Regular Work ☐ Work with Restricted Activities

Restriction _____

IO: Date Lost Time Began _____ Date/Est. Date To Return _____

Identify Personal Protective Equipment Used by Injured Employee _____

What Training or Instruction Had Been Given? _____

How Could This Accident Have Been Prevented? _____

Corrective Action _____

Are You Reporting This Incident as an Industrial Injury/Illness? ☐ Yes ☐ No

Signature _____ (Employee)

Date _____

Signature _____ (Supvr/Manager)

Date _____

Signature _____ (Safety Officer)

Date _____

Signature _____ (Proj. Manager)

Date _____

Signing This Report does Not Constitute Certification of an Industrial Claim

DISTRIBUTION

Original To: Division Secretary at Employee's Home Office

Copy To: ☐ Corporate Health & Safety
☐ Project Manager

☐ Regional Health & Safety Manager
☐ Site Safety File

INJURY/ILLNESS STATUS REPORT

Injury _____ Social Security No. _____ - _____ - _____

Home Address _____ Phone _____

Job Title _____ Home Division _____

Date/Time of Injury/Illness _____ a.m. Location: ☐ OHM Facility ☐ Project Site
_____ p.m. ☐ Other _____

Description of Injury/Illness _____

AUTHORIZATION TO RELEASE INFORMATION

I hereby authorize all physicians, hospitals, clinics and all persons to discuss with, and release to OHM Corporation and its authorized agents, any information or copies thereof acquired in the course of my examination or treatment for the injury identified above. This authorization shall not extend to any other medical condition, past or present, unless the same is causally or historically relevant or related to the injury referred to above.

Employee Signature _____ Date _____

PHYSICIANS OR MEDICAL PERSONNEL TO COMPLETE REMAINDER OF FORM

WORK STATUS

☐ Patient may return to work with no limitations

_____ Date _____

☐ _____ may return to work on _____

_____ Date _____

with limitations indicated. These restrictions are in

effect until _____ or until Reevaluation

_____ Date _____

on _____

_____ Date _____

Patient may work _____ hours in a work day.

☐ Patient is totally incapacitated at this time. Patient

will be reevaluated on _____

_____ Date _____

DEGREE

☐ Sedentary Work. Lifting 10 pounds maximum and occasionally lifting and/or carrying such articles as dockets, ledgers, and small tools. Although a sedentary job is defined as one which involves sitting, a certain amount of walking and standing is often necessary in carrying out job duties. Jobs are sedentary if walking and standing are required only occasionally and other sedentary criteria are met.

☐ Light Work. Lifting 20 pounds maximum with frequent lifting and/or carrying of objects weighing up to 10 pounds. Even though the weight lifted may be only a negligible amount, a job is in this category when it requires walking or standing to a significant degree or when it involves sitting most of the time with a degree of pushing and pulling of arm and/or leg controls.

☐ Medium Work. Lifting 50 pounds maximum with frequent lifting and/or carrying of objects weighing up to 25 pounds.

☐ Heavy Work. Lifting 100 pounds maximum with frequent lifting and/or carrying of objects weighing up to 50 pounds.

☐ Very Heavy Work. Lifting objects in excess of 100 pounds with frequent lifting and/or carrying of objects weighing 50 pounds or more.

LIMITATIONS

1. The patient may:

a. Stand/walk
☐ None ☐ 1-4 hours
☐ 4-6 hours ☐ 6-8 hours

b. Sit
☐ 1-3 hours ☐ 3-5 hours
☐ 5-8 hours

c. Drive
☐ 1-3 hours ☐ 3-5 hours
☐ 5-8 hours

2. Patient may use hands for repetitive:

☐ Single grasping ☐ Pushing & pulling
☐ Fine manipulation

3. Patient may use feet for repetitive movement as in operating foot controls:

☐ Yes ☐ No

4. Patient is able to:

	Frequently	Occasionally	Not at All
a. Bend _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Squat _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Climb _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PHYSICIANS REPORT

Diagnosis _____

Prognosis _____

Other _____

☐ Referred to company physician☐ Patient referred/admitted:

To Whom _____

Address _____

Phone _____

Date _____ Time _____

I _____ of this Report _____ Physician's Signature _____

Address _____ Phone _____

APPENDIX O

EMERGENCY RESPONSE PROCEDURE



OHM Corporation

HEALTH & SAFETY PROCEDURES

EMERGENCY RESPONSE

PROCEDURE NUMBER 47

Page 1 of 7

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

When responding to either an on-site or client emergency situation, OHM Remediation Services Corp. (OHM) will operate under the client's emergency response plan or the provisions outlined in this procedure.

2. PURPOSE

This procedure describes the minimum requirements for an emergency response plan as required in 29 CFR 1910.120(l).

3. GENERAL REQUIREMENTS

3.1 Pre-Emergency Planning

Prior to engaging in emergency response activities, OHM will endeavor to anticipate possible scenarios and have on stand-by, sufficient inventory and manpower to respond.

3.1.1 Stand-by inventory will be for emergencies only. The inventory will be replenished after every use.

3.1.2 Emergency responders will be current in regards to training and medical surveillance programs. Copies of all applicable certificates will be kept on file for personnel required to respond.

3.1.3 Prior to leaving the response center, it will be the responsibility of the response supervisor to brief the response team on anticipated hazards at the site. The response supervisor shall also be responsible for anticipating and requesting equipment that will be needed for response activities.

3.2 Personnel Roles, Lines of Authority and Communication

The senior emergency response official responding to an emergency shall become the individual in charge of a site-specific Incident Command System (ICS). All emergency responders and their communications shall be coordinated and controlled through the individual in charge of the ICS, assisted by the senior official present for each employer.

- 3.2.1** Upon arrival at the response site, the OHM response supervisor will coordinate the activities of the response team through the individual that is in charge of the ICS.
- 3.2.2** The response supervisor will develop the lines of authority for the individuals that make up the response team and also address the interactions with others (employers, client and regulatory agents). These lines of authority will be posted at the command center in an area where they are accessible to all personnel.
- 3.2.3** Communications will be established prior to commencement of any activities at the response site. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. The communication devices may be two-way radio, bull horns, public address systems, or any other media that permits all individuals involved to be made aware of pertinent information.

3.3 Emergency Recognition and Prevention

- 3.3.1** Because unrecognized hazards translate into emergencies, it will be the responsibility of the site supervisor and the site safety officer to recognize and identify all hazards that are found at the response site. These may include:
- **Chemical hazards**
 - Materials at the site
 - Materials brought to the site
 - **Physical hazards**
 - Temperature extremes
 - Fire/explosion
 - Slip/trip/fall
 - Electrocution
 - Poisonous plants/animals
 - Confined space
 - IDLH atmospheres
 - Excessive noise

- Physical hazards
 - Heavy equipment
 - Stored energy system
 - Pinch points
 - Electrical equipment
 - Vehicle traffic

3.3.2 Once a hazard has been recognized the site supervisor and/or the site safety officer will endeavor to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Procure MSDS for all chemicals involved
- Daily safety meeting
- Task specific training prior to commencement of activity
- Lock-out/tag-out
- PPE selection/use
- Permitting - hot work, confined space
- Trenching/shoring procedure
- Air monitoring
- Following all OHM SOP'S

3.4 Safe Distances and Places of Refuge

3.4.1 Prior to the beginning of any work at an emergency response site, the site supervisor and/or site safety officer will designate and identify both safe distances and places of refuge.

3.4.2 A safe distance will be established for:

- Third parties
- Support staff
- Hazard remediation workers

Each of the above groups of individuals must be made aware of these distances from the work site and these distances must be strictly enforced with site control and local law enforcement or site security staff.

3.4.3 Places of refuge must be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release
- Fire/explosion
- Power loss

- Medical emergency
- Foul weather
- Rest and breaks

In the event of an emergency, all the employees will gather at the designated place of refuge until a head count established that all are present and accounted for. No one is to leave the site without notifying the Incident Commander (IC) or the project supervisor.

3.5 Site Security and Control

- 3.5.1** All sites must be controlled before emergency response actions begin.
- 3.5.2** Security will prevent access to the site by third parties other than the client, other employers and regulatory agents.
- 3.5.3** Security and control can be established by local law enforcement, private security firms, OHM employees or the client's security force.
- 3.5.4** When feasible, the site should be fenced, taped or barricaded to clearly outline the hazardous area.
- 3.5.5** In all emergencies, the buddy system shall be used.

3.6 Evacuation Routes and Procedures

- 3.6.1** The site supervisor and/or site safety officer will develop and post a diagram of the site evacuation routes. Once established, evacuation routes from the site will be communicated to all personnel. Consideration should be given to marking escape routes, especially in confusing situations.
- 3.6.2** The site evacuation routes will be used in the event of:
 - Uncontrolled reactions
 - Fire/explosions
 - Foul weather
 - Medical emergencies
 - Power loss
- 3.6.3** The procedures for evacuation will be covered in a site safety meeting prior to commencement of emergency response activities.

3.7 Decontamination

- 3.7.1** Decontamination procedures will be established before any emergency response is undertaken.
- 3.7.2** All equipment used during a response to emergency situations involving hazardous chemicals will be decontaminated prior to leaving the site.
- 3.7.3** No equipment shall return to the shop until it has been properly decontaminated.
- 3.7.4** Personnel will avoid becoming grossly contaminated during emergency response activities.
- 3.7.5** All decontamination procedures outlined in the site health-and-safety plans will be observed.

3.8 Emergency Medical Treatment and First-Aid

- 3.8.1** The site supervisor is responsible for determining the need for and establishing emergency medical treatment requirements for each emergency response. He/she may delegate that responsibility to the site safety officer. As a minimum, a local hospital or emergency care facility shall be contacted and provisions made for transportation of personnel to that location in the event of an emergency at the worksite.
- 3.8.2** OHM shall ensure that all sites have an appropriately sized industrial first-aid kit. An eyewash station and safety shower will also be established if corrosive materials are expected to be encountered.
- 3.8.3** OHM will attempt to provide at least one individual that is certified in cardio-pulmonary resuscitation (CPR) and first-aid procedures at each site.
- 3.8.4** OHM employees will apply first-aid techniques to the best of their ability until emergency medical technicians (EMT) arrive.
- 3.8.5** All injuries, no matter how small, will be reported to the site safety officer or the site supervisor. An accident/injury/illness report will be completely and properly filled out and submitted to the proper departments.

3.8.6 OHM personnel who may be exposed to blood or other body fluids will don personal protective equipment and follow the procedures outlined in the OHM Bloodborne pathogen program.

3.9 Emergency Alerting and Response Procedures

3.9.1 OHM will establish a recognizable emergency signal prior to engaging in emergency response activities. The signal is one long blast of an air horn or the horn of a vehicle.

3.9.2 The emergency signal will be identified and all workers on site will be made aware of the signal in the pre-work site safety meeting.

3.9.3 If the client has an established emergency warning system, OHM employees will become familiar with the client's system and will respond to the system as required.

3.9.4 The safe distances and areas of refuge section of the site health-and-safety plan will designate the congregation points where employees will gather when an emergency signal has been given. All employees must be present and accounted for before the all clear signal is given.

3.10 Critique of Response and Follow-Up

3.10.1 After each emergency response activity, it will be the responsibility of the project manager to develop a critique of the response.

3.10.2 Recommendations for improvement of emergency response activities will be shared to improve our response efforts.

3.11 Personal Protective Equipment (PPE) and Dedicated Response Equipment

3.11.1 PPE will be stocked in a pollution control truck (PCT) for immediate availability when an emergency call is received. Responders should also carry a minimum of seven days of clothing and personal items.

3.11.2 When responding to an emergency all employees will bring with them;

- Hard hat
- Safety glasses
- Respirator spectacle kits (if needed)

- Full face piece respirator
- Steel toed boots
- Training and Medical Certification Documentation

NOTE: It is the responsibility of each employee to always have available the above equipment.

- 3.11.3** PPE levels will be established prior to anyone entering the hazardous area. The level of protection required for the response will be established based on the chemical, physical, environmental, or biological hazards present at the incident site. This information should be taken from the product MSDS or other reliable source.

NOTE: Any entry into a hazardous area where the specific product or airborne concentration of the product is unknown **MUST** be performed in minimum Level B PPE. This should include at least:

- Pressure-demand SCBA or airline respirator
- Tyvek coverall (inner)
- Saranex coverall (outer)
- Sample gloves (inner)
- PVC or neoprene gloves (outer)
- Robar or Tingly outer boots
- Hard hat
- All seams and joints securely sealed with duct tape

- 3.11.4** A list of dedicated PPE is included in the PCT inventory.

- 3.11.5** All responders will be trained in the use of, and proper donning/doffing techniques for all PPE.

- 3.11.6** Response equipment will vary depending on the situation and the chemical hazard involved. A list of dedicated tools and equipment is included in the PCT inventory.

- 3.11.7** Documentation and tracking of a project are critical to the overall success of the response effort. A list of paperwork and forms is supplied for domestic and international emergency response. It is the responsibility of the on-scene commander to keep an inventory of this list on hand.

APPENDIX C

WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

SITE HISTORY

As a result of secondary lead smelting operations conducted on the NL Site from 1903 to 1983, various residential areas in Granite City, Madison, and Venice, Illinois, are contaminated with lead as a result of stack emissions. OHM has recently remediated areas contaminated with lead at both hazardous and non-hazardous levels. The hazardous soils containing lead chips from batteries were taken to the NL Site, stabilized, and disposed as Illinois Special Waste after treatment at Laidlaw-Roxana. Non-hazardous soils were transported directly from the residential areas and disposed as a separate Illinois Special Waste at Laidlaw-Roxana. The waste to be generated under this contract will continue to be shipped to Laidlaw-Roxana until approval to dispose at an alternate facility is granted from the State of Illinois.

BACKGROUND

The award of a delivery order to OHM, DACW45-89-D-0506, Delivery Order No. 17, is to provide immediate contractor continuity to minimize immediate exposure of stack emissions in the soil at residential locations. The lead contaminated soils consist of sod, flower beds, and gardens and will be removed up to a depth of 3 inches, 6 inches, or 12 inches, depending on the depth of lead contamination above the action level of 500 milligrams per kilogram (mg/kg) total lead at each area addressed.

It is anticipated, based on previous site investigations, that the site soils contain total lead levels greater than 500 mg/kg and will yield a Toxicity Characteristic (TCLP) analysis less than 5.0 milligrams per liter (mg/L). Therefore, all lead contaminated soils with these characteristics will be treated as Illinois Special Waste and will be disposed off site at a state pre-approved RCRA Subtitle D, Treatment, Storage, Disposal facility (TSDF). If any lead contaminated soils yield TCLP analysis greater than 5.0 mg/L, then they will be manifested, transported, and disposed as RCRA Hazardous Waste at a RCRA Subtitle C TSDF.

SUBMITTALS

OHM will submit to the disposal subcontractor all the signed State of Illinois required forms for timely approval of the waste for disposal. This submittal will include the required analysis of a representative sample (Illinois "Green Sheet"), Illinois Solid Waste Management Act Generators' Declaration, Pesticide/Herbicide Declaration Letter, and Waste Profile Sheets. A letter from the generator is anticipated requesting expedition of the permit. These submittals will be provided to the disposal subcontractor within 24 hours of data availability. OHM will attempt to provide available pre-characterization data which includes soil lead levels from residential areas.



ESTIMATED VOLUME OF WASTE

The volume of contaminated soil to be removed under this contract will depend on the final number of areas identified, the depth of the excavation, the dimensions of each area, and is as yet unknown. Initial estimates have placed the contamination at each area to average approximately 5,200 square feet.

OHM is shipping only non-hazardous Special Waste from identified remote locations. The waste is currently approved for shipment to Laidlaw-Roxana facility for direct placement. Laidlaw will continue to receive waste up to 7,000 cubic yards. Approval to dispose the waste at alternate facilities (Waste Management Inc. [WMI] Chain-of-Rocks and Milam Landfill) is currently being pursued. When approval is granted by the Illinois EPA, the waste will be shipped to the WMI facility.

NON-HAZARDOUS SPECIAL WASTE FROM THE REMOTE LOCATIONS

Lead contaminated soil above the action limit of 500 mg/kg total lead from the identified remote locations will be loaded into lined semi dump trucks and taken directly to either Laidlaw-Roxana or a WMI facility. This wastestream is currently approved for disposal at Laidlaw-Roxana.

ACTIVITY AT THE REMOTE LOCATIONS

Soils identified above the 500 mg/kg limit, but less than 5.0 mg/L TCLP lead will be loaded into lined end dump trucks for transport to the selected disposal facility. Detailed tracking of the individual loads of the special waste from each remote location is critical.

OHM expects to excavate up to four separate residential areas at a time, shipping up to 48 lined semi dump trailer loads for landfill disposal (10 to 12 trucks making 3 to 4 round trips per day) between the hours of 7:00 am and 6:00 pm CST 6 days per week. It is likely that on some days OHM will not ship any waste or will ship fewer than 30 loads due to weather, set up or tear down of equipment, etc. OHM does not expect rejected loads or delays greater than 1 hour in off loading of the material. Problems with acceptance or off loading of material by the landfill will be immediately (within 1 hour) addressed to Mr. Steve Letany of OHM at 618-876-9025, or to Mr. Tom Seem of OHM at 618-876-8406 for timely resolution.

TRACKING THE SPECIAL WASTE FROM THE REMOTE LOCATIONS

The day before loading begins, the Transportation and Disposal Coordinator (TDC) will generate manifests and tracking forms covering the expected number of loads from each remote location to be loaded the following day. The manifests will be handed to the USACE representative for signature by a generator's representative. When the signed manifests have been signed and returned to the TDC, the tracking form will be initiated by the TDC including the name of the team leader, the remote location, and date (of shipment).



At the beginning of each shift, the team leaders assigned to the remote locations they are to load out will be handed the manifests and tracking forms for their particular location(s). The fully trained team leaders will assist the tracking by handing the driver the correct manifest in the right consecutive order.

Figure 1, Illinois Hazardous Waste Manifest, is an example of the manifest to be used for tracking of the waste. Note the word Hazardous has been deleted. These are critical items for the disposal facility to accept the waste shipped and track for their own purposes. Figure 2 is an example of the tracking form to be used to track the manifests used. A unique five-digit number will be assigned for each shipment. An example for the unique five-digit number follows: 07201, where 07 is the activity identification number for Alley 53, 2 designates the waste as special waste to be direct loaded to Laidlaw-Roxana, and 01 is the consecutive number of the shipment from the remote location. Another example: The five digit number 21221 would be the 21st load of special waste from 214 Watson loaded direct to Laidlaw-Roxana.

FINAL REPORT

OHM will include as part of the final report for this project a description of the waste management activities including copies of the complete manifest package(s), transportation daily log sheets, and shipping papers.



PLEASE TYPE

(Form designed for use on nine (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039 Expires 9-30-94

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. ILP200001409		2. Page 1 of 1		Information in the shaded areas is not required by Federal law, but is required by Illinois law.	
3. Generator's Name and Mailing Address USEPA Region V / Taracorp, 77 West Jackson Blvd. Chicago, IL 60605-3590				Location If Different 1200 16th Street Granite City, IL		A. Illinois Manifest Document Number IL-6407587 FEE PAID IF APPLICABLE	
4. "24 HOUR EMERGENCY AND SPILL ASSISTANCE NUMBERS" 312/353-2000				B. Illinois Generator's ID 1111901401310101		C. Illinois Transporter's ID 10101913	
5. Transporter 1 Company Name Beelman Truck Co.		6. US EPA ID Number ILD007814825		D. (800) 541-5918		Transporter's Phone	
7. Transporter 2 Company Name		8. US EPA ID Number		E. Illinois Transporter's ID		F. Transporter's Phone	
9. Designated Facility Name and Site Address Chain-of-Rocks, RDP Hwy 270 and Rte. 3 Granite City, IL 62040				10. US EPA ID Number		G. Illinois Facility's ID 111191810110101012	
						H. Facility's Phone (618) 797-0405	
11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)				12. Containers No. Type		13. Total Quantity	
a. Lead Contaminated Soil, Not Regulated, Not Hazardous by D.O.T.				0-0-1 D T		14. Unit Wt/Vol	
b.						L Waste No. XX	
c.						XX	
d.						XX	
J. Additional Description for Materials Listed Above Lead Contaminated Soil With TCLP Results for Lead Less Than 5.0 mg/kg				K. Handling Codes for Wastes Listed Above in Item 14 G = Gallons Y = Cubic Yards			
15. Special Handling Instructions and Additional Information Bill Disposal to OHM Corp., P.O.# * WEAR GLOVES WHEN HANDLING THE MATERIAL. AVOID BREATHING DUST. **In Case of Emergency Call 312/353-2318							
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.							
Printed/Typed Name				Signature			
				Date Month Day Year			
17. Transporter 1 Acknowledgement of Receipt of Materials				Date			
Printed/Typed Name				Signature			
				Month Day Year			
18. Transporter 2 Acknowledgement of Receipt of Materials				Date			
Printed/Typed Name				Signature			
				Month Day Year			
19. Discrepancy Indication Space							
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.							
Printed/Typed Name				Signature			
				Date Month Day Year			

This Agency is authorized to require, pursuant to Illinois Revised Statute, 1989, Chapter 111 1/2, Section 1004 and 1021, that the information be submitted to the Agency. Failure to provide this information may result in a civil penalty against the owner or operator not to exceed \$25,000 per day of violation. Publication of this information may result in a fine up to \$50,000 per day of violation and imprisonment up to 5 years. This form has been approved by the Permit Management Center.

COPY 1. TSD MAIL TO GENERATOR

FIGURE 1

TRANSPORTATION & DISPOSAL TRACKING FORM

1 WASTE STREAM	2 DISPOSAL FACILITY	3 - UPS a. To COE b. Number c. COE Approval d. To TSDP	4 - TSDP APPROVAL 5 - P.O.#	6 - MANIFEST a. To COE b. Number c. COE Approval	7 - PICKUP a. Scheduled b. Actual c. Acceptance	8 TSDP RECEIVED MANIFEST	9 NO. OF DAYS	10 DATE MANIFEST TO CLIENT	11 DATE EXCEPTION RPT FILED	12 - SUBTITLE 6 FACILITY a. Yes/No b. If Yes, Date Documentation Received
		a.		a.	a.					a.
		b.		b.	b.					b.
		c.		c.	c.					
		d.								
		a.		a.	a.					a.
		b.		b.	b.					b.
		c.		c.	c.					
		d.								
		a.		a.	a.					a.
		b.		b.	b.					b.
		c.		c.	c.					
		d.								
		a.		a.	a.					a.
		b.		b.	b.					b.
		c.		c.	c.					
		d.								
		a.		a.	a.					a.
		b.		b.	b.					b.
		c.		c.	c.					
		d.								
		a.		a.	a.					a.
		b.		b.	b.					b.
		c.		c.	c.					
		d.								
		a.		a.	a.					a.
		b.		b.	b.					b.
		c.		c.	c.					
		d.								

WTS - WASTE PROFILE SHEET
COE - CORPS OF ENGINEERS
TSDP - TRANSPORTATION & STORAGE DISPOSAL FACILITY
P.O. - PURCHASE ORDER

FIGURE 2

APPENDIX D

CONTINGENCY PLAN

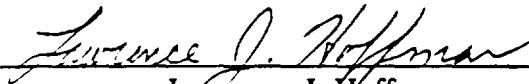
**CONTINGENCY PLAN FOR
REMEDATION OF LOCATIONS IN
GRANITE CITY, MADISON, AND
VENICE, ILLINOIS, ASSOCIATED WITH
NL INDUSTRIES/TARACORP SUPERFUND
SUPERFUND SITE
CONTRACT NO. DACW45-89-D-0506
DELIVERY ORDER NO. 0017**

Prepared by:



OHM Remediation Services Corp.
Midwest Region

Approved by:



Lawrence J. Hoffman
Project Manager

October 7, 1994
Project 16473

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1.0 INTRODUCTION

NL Industries, as former owner of the location, voluntarily entered into an Agreement and Administrative Order by Consent with the United States Environmental Protection Agency (USEPA) and Illinois Environmental Protection Agency (IEPA) in May 1985 to implement a Remedial Investigation/Feasibility Study (RI/FS) for the location and other potentially affected areas. Taracorp was not a party to the agreement due to the fact that it filed for bankruptcy. The USEPA determined that the location was a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) facility, and it was placed on the National Priorities List on June 10, 1986.

1.1 PROJECT OBJECTIVES

The objectives of this contingency plan are to excavate lead-contaminated soil and battery chips and confirm that all contaminated soil has been removed to the action level of 500 parts per million (ppm). This work plan will only be implemented if potentially hazardous (visible chips) materials are encountered while performing the stack emissions removal. The hazardous wastes removed from each site will be transported directly to an approved hazardous waste landfill. Nonhazardous wastes excavated from the site, which do not contain battery chips, will be transported directly to a RCRA Subtitle D landfill.

1.2 DESCRIPTION

This action requires the excavation, treatment, and disposal of fill material placed in alleys, parking lots, driveways, and yards in residential communities. The communities include Granite City, Madison, and Venice, Illinois. The Record of Decision (ROD) established the action levels for this project at 500 ppm of lead for residential areas and visibly clean for driveways, alleys, etc. Following the removal of the contaminated material, the impacted areas will be restored. This restoration will include sodding the yards and placing rock on or paving the alleys, driveways, and parking lots.



2.0 SCOPE OF WORK

This section has been prepared based upon the scope of work (SOW) contingency delineated by the document provided to OHM by USACE entitled:

SCOPE OF WORK FOR
CONTRACT NO. DACW45-89-D-0506
STACK EMISSIONS (LEAD) REMOVAL
GRANITE CITY (MADISON COUNTY), ILLINOIS
DELIVERY ORDER 17
JUNE 23, 1994
FINAL REVISED

The SOW in general encompasses the following tasks:

- ▶ Chemical Data Acquisition Plan (CDAP) plan development, if required
- ▶ Site visit
- ▶ Site administration
- ▶ Mobilization/demobilization
- ▶ Site preparation and teardown including the setup and teardown of decontamination facilities, support equipment trailers, clearing and grubbing of brush, paving, and landscaping
- ▶ Excavation and testing of contaminated soil and restoration of contaminated areas
- ▶ Testing of soil from cleanup locations to verify that the 500 ppm lead cleanup level has been met
- ▶ Transportation and disposal of hazardous, nonhazardous, and special wastes
- ▶ Final project report

2.1 WORK PLAN DEVELOPMENT

The contingency work plan describes how the work will be performed according to the SOW as delineated by USACE and environmental, industrial standard, and health and safety requirements.



The contingency work plan is only in case of an urgent response to hazardous sites (e.g., visible battery chips). The health and safety plan (HASP) and CDAP will only be developed when an urgent response occurs. Only the signed cover sheets for the previously approved HASP and CDAP are attached. This will provide less paper volume for the contingency plan, but will provide the guidelines from the previous contract to respond promptly with site-specific plans.

2.2 SITE ADMINISTRATION/LOGISTICAL SUPPORT

Prior to full-scale mobilization to the location, logistical preparation activities will be performed. These activities are expected to include:

- ▶ Conduct preconstruction meeting
- ▶ Arrange for waste hauling licenses
- ▶ Meet with property owners
- ▶ Locate utilities at each property
- ▶ Establish transportation routes between each property and to the approved disposal facility
- ▶ Coordinate with local agencies and hospital

The project site administration will be centrally established at the former USACE maintenance facility. Site administrative activities performed from this location will include:

- ▶ Site supervision
- ▶ Cost tracking/reporting
- ▶ Health and safety administration
- ▶ Waste tracking/documentation
- ▶ Field sampling/analytical support
- ▶ Field purchasing/subcontract management
- ▶ Logistical support

2.3 MOBILIZATION/DEMOBILIZATION

This task involves the actual transportation of personnel, equipment, materials, and other resources to and from the project site. A majority of the personnel and equipment will be mobilized at the beginning of the project and demobilized at the end of the project. This is especially true for the supervisory/administrative personnel and the support equipment such as vehicles and decontamination/office trailers. Most personnel and equipment will be mobilized from OHM's St. Louis, Missouri, Division. Subcontractor mobilization and demobilization will



be managed by the OHM project manager in close conjunction with site supervisory and USACE identified site-specific needs. OHM expects the actual mobilization will never happen. The personnel are assumed to be on site for the stack emissions removal.

All necessary permits and licenses will be secured before site mobilization. The transporter companies and disposal facilities will be USEPA licensed operations. Also, prior to mobilization, all on-site employees will have completed Occupational Safety and Health Administration (OSHA) 40-hour hazardous materials training.

2.4 SITE PREPARATION AND TEARDOWN - ALLEY/LOT EXCAVATION

The command post/project on-site office and equipment staging area will remain at the former USACE maintenance facility. The USACE-owned location has been chosen for its security, accessibility, and storage area attributes. The area will be fenced, including a locking gate. This area is in a location accessible to all of the work areas and has sufficient office and equipment storage space.

Alley/lot excavation equipment will be left on the excavation site, and a security service will observe the off hours. While loading materials for disposal or stockpiling, the tires of the trucks may come in contact with contaminated material. When this occurs, a portable decontamination pad will be utilized. It will be set up at the exit point, and the tires will be sprayed off with a high-pressure water laser as the vehicle exits the site. The decontamination rinsate will be collected and will be applied to contaminated soil as it is loaded into containers as a dust control measure.

At the conclusion of the project, all equipment used on the site will be decontaminated before demobilization. Portable decontamination pads will again be used. Gross contamination will be scraped from the machines prior to being washed with a high-pressure water laser. The decontamination rinsewater will be collected and will be applied to the last loads of contaminated soil as a dust control measure.

2.5 EXCAVATION OF CONTAMINATED SOIL AND RESTORATION OF SITES

The excavation techniques employed at each location will vary according to location accessibility and the depth and extent of material to be removed. Minimization of disturbances to adjoining properties/areas will also be a key consideration in performing each excavation. OHM anticipates using tracked excavators, backhoes, Bobcats, and manual removal methods.

Dust control will be a major effect. A hydro meter and hose will be available at all times to prevent fugitive emissions. Water from decontamination sources will be recycled this way.

During excavation activities, engineering controls and security measures such as surrounding the exclusion zones with fluorescent orange PVC barrier fencing will be employed to prevent cross contamination and unauthorized entry to exclusion zones.



After receiving analytical results that confirm the cleanup criteria of 500 ppm has been achieved, OHM will restore the locations to preremedial conditions. Excavations will be backfilled with clean soil and paving completed as required by the SOW. Fencing and other structures removed during remediation will be replaced and seeding and revegetation performed where necessary.

OHM will utilize a local fill source chosen for the quality of fill and price. OHM will collect one sample of the backfill source to be used for the restoration activities. Additional backfill samples may be necessary if the soil composition/appearance changes noticeably. The anticipated analyses for the backfill sample include volatile and semivolatile organics, pesticides, and RCRA metals.

2.6 TESTING OF SOIL FROM CLEANUP LOCATIONS

At the residential areas, OHM will screen samples on site to quickly determine the levels of lead using XRF technology. The XRF screening will be performed to assist in removal of all material in the residential areas above 500 ppm lead. Sampling locations will be randomly selected on each wall and/or the floor of the excavation area.

A minimum of three verification samples from each excavation at the residential locations will be sent to an off-site laboratory for analysis. The CDAP will have the explicit formula for determining the number of samples and the estimated number of samples per location. The areas will be backfilled and restored after verification sampling.

2.7 TRANSPORTATION AND DISPOSAL

The hazardous waste (visible chips) will be stockpiled on the individual site and directly loaded for disposal. IEPA approval for disposal at a RCRA landfill will be established before shipment. Upon approval, this waste will be transported to a permitted/hazardous landfill for disposal.

2.8 SITE SECURITY

OHM personnel will monitor site security during the daylight operating hours. Security guards will monitor site security on the nonoperating hours. The existing perimeter fencing will be maintained with appropriate signs to keep out unauthorized personnel.

2.9 FINAL PROJECT REPORT

OHM will issue a final report at the completion of the project. The report will be prepared in draft final form for USACE review. The report will contain a summary of the work performed at each location, photographic documentation, analytical report, operation of treatment process weights, and transportation and disposal documentation.



OHM's transportation and disposal coordinator will submit all relevant supporting documentation such as analytical reports and MSDS with the above-mentioned documents, accompanied with a cover letter which describes the logic by which specific waste disposal alternatives are suggested by OHM to USACE. OHM will not ship any wastes without prior approval and signature of waste manifests by USACE on behalf of the USEPA.

The preparation of the final report is discussed in Section 2.9 of the work plan.

3.2 PRECONSTRUCTION ACTIVITIES

Preconstruction activities for this project include the following items:

- ▶ Attending a preconstruction meeting with USACE
- ▶ Issuing subcontracts for subcontracted work which can be defined prior to initiation of the project
- ▶ Communicating with JULIE (utility locate) to locate potential utilities at the job site
- ▶ Obtaining permits as needed
- ▶ Obtaining soil samples for waste characterization
- ▶ Others as needed
- ▶ Videotaping of residential property so that it can be properly restored following completion of the project

OHM understands that USACE has arranged for right of entry to the contaminated areas from the USEPA and adjoining land owners as necessary.

3.3 CONSTRUCTION ACTIVITIES

The primary construction activities for this project include the following:

- ▶ Mobilization of personnel and equipment
- ▶ Site preparation including clearing and grubbing of support areas and the setup of site office, support zones, decontamination stations, and exclusion zones.
- ▶ Excavation of contaminated soil
- ▶ Visual and/or analytical determinations of removal criteria fulfillment



3.0 TECHNICAL APPROACH

This section discusses the operational methods, types of personnel, and equipment which will be utilized to complete the SOW.

3.1 SCHEDULE MONITORING AND CONTROL

The work tasks will be performed according to the schedule developed for the project. Any major modifications to the work plan will be submitted to USACE for review prior to the actual implementation of the modification.

The schedule will be monitored and controlled in conjunction with the tracking of costs through the use of computerized cost/resource tracking and project management techniques developed by OHM.

3.1.1 Submittals

Submittals include this final project work plan submitted as per the USACE SOW dated June 23, 1994; daily submittals; weekly status reports; hazardous-waste manifest biennial reports; hazardous-waste manifests; and a final report.

Weekly status reports will be prepared in accordance with the requirements of the and submitted by 0700 Central Standard Time on each Monday to the locations specified in Table 1 of the SOW.

OHM will submit to the USACE estimates of the amounts and types of wastes generated at the location for disposal in the weekly status reports and annual and biennial hazardous-waste manifest reports. OHM will also prepare special waste biennial reports for non-hazardous special waste disposal at facilities outside of Illinois. OHM will obtain currently required reporting forms related to the shipment and disposal of hazardous waste as per the SOW.

Based on information provided by USACE/USEPA/IEPA, the excavation sites are part of the NL Industries/Tara Corp. Superfund Site. OHM will prepare manifests for USACE review, approval, and signature prior to the scheduled shipment of any hazardous wastes. OHM will also submit relevant shipping papers for nonhazardous wastes which may require transportation and disposal from this project. OHM's Midwest Region Transportation and Disposal Department will prepare hazardous waste manifests, and nonhazardous waste manifests. OHM's transportation and disposal coordinator will review all waste profiles, land disposal restriction notifications, certifications, and waste manifests prior to their submittal to USACE.



- ▶ Backfill and compaction activities
- ▶ Paving and/or landscaping activities

3.3.1 Site Preparation

Site preparation includes the setup of a support office near the work area and the establishment of support zones, decontamination stations, and exclusion zones.

The office will be set up in buildings owned by the USACE located at the former USACE maintenance facility. Electrical power is already available at site, and telephone lines will be arranged by OHM. The off-shift storage of secured equipment will also be at this location.

Dust control will be a major effort. A hydro meter with hose will be available at all times to prevent fugitive emissions. Water from decontamination sources will be recycled this way.

All sampling equipment utilized at the locations will be decontaminated according to the procedures described in the CDAP.

3.3.2 Site Excavation

Each location has unique characteristics which mandate particular methodologies of remediation. But, in general, the locations can be separated into two categories: residential yards and alleys/driveways/parking lots. This section describes the general remediation methodology for these two categories and the following sections describe each individual location's nuances that need to be addressed.

3.3.2.1 Residential Areas

Most of the residential yards that need to be remediated will include the removal of sod and a varying depth of soil. These wastes will be excavated using a tracked excavator, backhoe, and/or a Bobcat. At some locations hand digging will be necessary. The largest piece of equipment that can be utilized given the logistics of the location will be used. Hazardous soil will then be loaded into the licensed hauler trucks for transportation to the disposal facility.

3.3.2.2 Alleys/Driveways/Parking Lots

Most of the alleys, driveways, and parking lots to be remediated are aggregate soil mixtures. Most locations are accessible by the tracked excavator but some will require smaller equipment and hand digging. The wastes removed from the alleys and parking lots will be segregated as hazardous or nonhazardous waste according to the Woodward-Clyde report and handled as described above for the residential properties. Alleys will be backfilled and chip sealed. The alleys will require minor landscaping at the edges of the pavement (i.e., top soil, raking, and seeding).



3.4 WASTE TRANSPORTATION AND DISPOSAL

Wastes removed from the sites will be transported to one of two locations. Hazardous wastes will be transported directly to the RCRA landfill. This transportation will be documented using manifests approved by the IEPA. Nonhazardous wastes removed from the sites will be transported directly to the nonhazardous waste Subtitle D landfill. OHM will utilize licensed haulers and disposal firms.



APPENDIX E

EPA SPECIAL WASTE LETTER



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

August 18, 1994

Mr. Doug Clay
Manager of Permit Section
Illinois Environmental Protection Agency
1340 North 9th Street
P.O. Box 19276
Springfield, IL 62794-9276

REPLY TO THE ATTENTION OF:

RE: REQUEST TO EXPEDITE NON-HAZARDOUS WASTE DISPOSAL PERMIT NL INDUSTRIES/TARA CORP SUPERFUND SITE GRANITE CITY, ILLINOIS

Dear Mr. Clay:

The purpose of this letter is to respectfully request that the Illinois Environmental Protection Agency expedite a permit for the disposal of non-hazardous waste in the State of Illinois. The waste is being removed from several locations in Granite City, Madison, and Venice, Illinois. The wastes are being removed as a remedial action related to the NL Industries/Tara Corp Superfund Site in Granite City, Illinois. This request has been prepared with the intention of answering each of the items listed on the IEPA Questionnaire for Expediting Permits.

The permit needs to be expedited because the sites presently assigned remedial priority by the United States Environmental Protection Agency have children living on them or near them and potentially pose health risks to the children.

The permit was not submitted sooner since the prioritization of the sites was recently completed with signed access agreements by the property owners.

The non-hazardous wastes removed from several completed locations have been disposed at Laidlaws' Roxanna Landfill (Permit # 932436) and Laidlaws' Bridgeton, Missouri Landfill. Hazardous wastes from the remedial activities were previously shipped to PDC #1 in Peoria, Illinois, Heritage Environmental Services Inc. in Indianapolis, Indiana and Envirite in Harvey, Illinois.

The NL Industries/Tara Corp Superfund Site is presently on the USEPA's National Priorities List. The expeditious issuance of a permit would assist to decrease further potential exposure of human life and the environment to lead. All persons living and working in the communities listed above would benefit from the expeditious issuance of the permit.

Several government agencies including the United States Environmental Protection Agency, the United States Army Corps of Engineers and the Illinois Environmental Protection Agency, have recognized the importance of remediating these sites as quickly as possible. These agencies have worked in cooperation to initiate this project and implement remediation. The expeditious issuance



of the non-hazardous waste permit would further exemplify the commitment to remediate the sites quickly and efficiently.

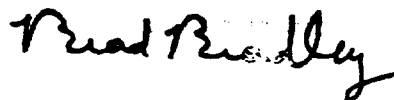
The most logical and most effective alternative for the disposal of non-hazardous wastes removed from these sites is to dispose of the wastes at appropriate, licensed non-hazardous special waste landfills in the State of Illinois. Other alternatives have been investigated, in fact the possibility of performing on-site stabilization of hazardous waste becomes a viable alternative. However, the quantity of non-hazardous waste with stabilization will increase, further stressing the need for the permit to ship directly to a landfill.

Recycling/recovery options have also been considered. Both Exide Corporation in Muncie, Indiana and Doe Run in Mercur, Missouri have indicated that the lead levels were not sufficient to cost effectively reclaim the lead present.

There is currently a permit for Laidlaw Roxanna to dispose of non-hazardous waste. The new permit for WMI, Milan and Chain of Rocks is justified by cost analysis.

Brian Culnan, Environmental Protection Specialist for the DEPA is the project contact for DEPA. Mr. Culnan has graciously offered to answer questions you may have concerning this project. Mr. Culnan's telephone number is 217-782-5760.

Sincerely,



Brad Bradley
Remedial Project Manager